# OBJECT LESSONS
## FOR
# RURAL SCHOOLS

## BOOK II

## VINCENT T. MURCHÉ

The Calcutta Training Schoo

# OBJECT LESSONS FOR RURAL SCHOOLS

# THE TEACHER'S MANUAL

OF

# OBJECT LESSONS

FOR

# RURAL SCHOOLS

Ed
315

BY

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## BOOK II

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# PREFACE

THESE manuals and the Reading Books which accompany them have been prepared as the outcome of the "**Circular to Managers and Teachers of Rural Elementary Schools,**" which was issued by the Board of Education in April last.

The Author, **himself an old rural teacher,** has endeavoured to cover as much ground as possible in meeting the requirements of that Circular, and of the schemes set forth in the Revised Instructions to H.M. Inspectors. But it should be distinctly borne in mind that **these books are not intended to form a rigid cast-iron scheme of lessons,** to be blindly followed by every teacher into whose hands they may fall. They are rather to be considered as **a store-house from which the teacher may draw,** to suit his own special conditions; and, further, the ample provision of subjects in each volume will enable him for years to construct scheme after scheme, all of them dealing with **just those subjects which will appeal to country children.**

The great aim of the teaching throughout has been to **awaken** in the children **the spirit and habit of observation and inquiry,** and thus to foster in them the **love of country life,** and the only true way to do this is to follow the excellent and wise recommendation of the Circular referred to above, in taking them for rambles wherever possible, and giving them lessons on the spot, which can be afterwards recapitulated, amplified, and illustrated in school by means of pictures, drawings, and specimens.

It is only those who know what it means to carry on a country school (if not single-handed, at least with inadequate assistance) who can really sympathise with the rural teacher and his work. This the Author canfully claim to do, and in consequence the Scheme has been arranged to meet as nearly as possible the conditions of the average village school.

All reference to standards has been carefully avoided, and the lessons have been arranged to suit the usual tripartite division of the school as recommended in the schemes of the Government Circular. It is confidently expected that, with the wealth of natural objects for illustration always ready to hand, the course will prove attractive both to teachers and children.

Notwithstanding the fact that the books have been written primarily to provide for the wants of the Rural School, it must not be forgotten that there are hundreds of provincial towns in all parts of the country, where the everyday life of young and old is more or less surrounded by rural pursuits, where living in the town they breathe the atmosphere of the country, where every walk takes them into the heart of the country, and where the villagers from all round come and go regularly on market-days.

In all such towns it is thought that this scheme may find hearty appreciation.

~~Ed/307~~ Ed/315

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# THE CURRICULUM OF THE RURAL SCHOOL

THE following circular to managers and teachers of rural elementary schools has been issued by the Board of Education:—

BOARD OF EDUCATION, WHITEHALL,
LONDON, S.W., *April* 1900.

SIR—The Board of Education are anxious to call the attention of managers and teachers of elementary schools situated in the agricultural districts of England and Wales to the importance of making the education in the village school more consonant with the environment of the scholars than is now usually the case, and especially of encouraging the children to gain an intelligent knowledge of the common things that surround them in the country. From experience gained in various districts it is found that by a suitable arrangement and handling of the school curriculum this object can often be attained without necessarily adding any new subjects to the time-table, or demanding any undue burden or work from teachers or scholars.

The Board would deprecate the idea of giving in rural elementary schools any professional training in practical agriculture, but they think that teachers should lose no opportunity of giving their scholars **an intelligent knowledge of the surroundings of ordinary rural life** and of showing them how to **observe the processes of nature** for themselves. One of the main objects of the teacher should be to develop in every boy and girl that **habit of inquiry and research** so natural to children; they should be encouraged to ask their own questions about the **simple phenomena of nature** which they see around them, and themselves to **search for flowers, plants, insects,** and other objects to illustrate the lessons which they have learnt with their teacher.

The Board consider it, moreover, highly desirable that the natural activities of children should be turned to useful account—that **their eyes**, for example, **should be trained to recognise plants and insects** that are **useful** or **injurious** (as the case may be) **to the agriculturist**, that **their hands should be trained to some of the practical dexterities of rural life**, and not merely to the use of pen and pencil, and that they should be taught, when circumstances permit, how to **handle the simpler tools that are used in the garden** or on the farm, before their school life is over.

The Board are of opinion that one valuable means of evoking interest in country life is to select for the object lessons of the lower standards subjects that have a connection with the daily surroundings of the children, and that these lessons should lay the foundation of a somewhat more comprehensive teaching of a similar kind in the upper standards.[1] But these object lessons must not be, as is too often the case, mere repetitions of descriptions from text-books, nor a mechanical interchange of set questions and answers between teacher and class. To be of any real use in stimulating the intelligence, the object lessons should be the practising ground for observation and inference, and **they should be constantly illustrated by simple experiments and practical work in which the children can take part, and which they can repeat for themselves at home with their own hands.** Specimens of such courses can be obtained on application to the Board of Education. These may be varied indefinitely to suit the needs of particular districts. They are meant to be typical and suggestive, and teachers, it is hoped, will frame others at their discretion. Further, these lessons are enhanced in value if they are connected with other subjects of study. The object lesson, for example, and the drawing lesson may often be associated together, and the children should be taught to draw actual objects of graduated difficulty, and not merely to work from copies. In this way they will gain a much more real knowledge of common implements, fruits, leaves, and insects than if these had been merely described by the teacher or read about in a lesson-book. Composition exercises may also be given—after the practical experiments and observations have been made—for the purpose of training the children to express in words both what they have seen and the inferences which they draw from what they have seen; and the children should be frequently required and helped to describe in their exercise books sights of familiar occurrence in the woods and in the fields. Problems in arithmetic connected with rural life may also be frequently set with advantage.

The Board of Education also attach considerable importance to work being done by the elder scholars outside the school walls, whether such work takes the form of elementary mensuration, of **making sketch plans of the playground and the district surrounding the school**, of **drawing common objects**, of **paying visits of observation to woods, lanes, ponds, farms, and other suitable places under the guidance of the teacher**, or **of the cultivation of a school garden.**

The teacher should as occasion offers take the children out of doors **for school walks at the various seasons of the year**, and **give simple lessons on the spot** about **animals in the fields and farm-yards**, about **ploughing and sowing**, about **fruit trees and forest** trees, about **birds, insects, and flowers**, and **other objects of interest.** The lessons thus learnt out of doors can be afterwards carried forward in the schoolroom by reading, composition, pictures, and drawing.

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[1] The important points to be observed in all object teaching were set out in the Official Circular (No. 369) issued on this subject on 25th June 1895, copies of which may be obtained from the Board of Education.

In this way, and in various other ways that teachers will discover for themselves, children who are brought up in village schools will learn to understand what they see about them, and to take an intelligent interest in the various processes of nature. This sort of teaching will, it is hoped, directly tend to foster in the children a genuine love for the country and for country pursuits.

It is confidently expected that the child's intelligence will be so quickened by the kind of training that is here suggested, that he will be able to master, with far greater ease than before, the ordinary subjects of the school curriculum.

The Board would further urge upon any teachers now in rural schools who happen themselves to be of urban upbringing, or to have been trained in urban centres, to seize every opportunity of gaining a closer insight into the special conditions and problems of rural life, and they trust that those whose previous education has not enabled them to obtain full knowledge of the main principles and phenomena of rural life and activities will be able to attend such holiday courses and classes as may be placed within their reach for this purpose by county councils or other local committees; since it is only when the teacher is genuinely interested in and well informed about the occupations of country life that any such results can be looked for in the children as have been referred to as the proper object of rural schools in the present circular.

I have the honour to be, Sir, your obedient servant,

G. W. KEKEWICH.

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EDUCATION DEPARTMENT.

*Circular to H.M. Inspectors.* Circular **369.**

## Object Teaching.

EDUCATION DEPARTMENT, WHITEHALL,
LONDON, 25*th June* 1895.

SIR—It has been observed that in Schools in which Object Teaching has been introduced with most success the teachers have carefully distinguished between two kinds of instruction which in other schools are not seldom confused. These two kinds of instruction are—(1) observation of the Object itself, and (2) giving information about the Object. This distinction is of importance, because the scope and method of the lesson differ according to its nature. Object teaching leads the scholar to acquire knowledge by observation and experiment; and **no instruction is properly so-called unless an Object is presented to the learner so that the addition to his knowledge may be made through the senses.**

Junior teachers have not unfrequently given lessons before H.M. Inspectors, which were wrongly described as Object Lessons, because in dealing with the topic selected no suitable appeal was made to the eye of the scholar.

The following suggestions, which have been made by practical teachers, will be found useful:—

The teacher should select only so many of the Objects set forth in the appended or other similar lists as can be dealt with in the year, without overburdening the scholars. Habits of observation are better cultivated by the thorough examination of a few objects than by the superficial treatment of many.

No object should be chosen which the teacher cannot thoroughly illustrate either by the object itself or by some adequate representation of the object, or by both. All that is purely technical, whether in the mode of study or the language and terminology, should be carefully avoided.

The children should be encouraged to bring with them to the lesson illustrative specimens which they have collected or borrowed from friends.

The children should be encouraged to make simple drawings illustrative of their observations, wherever possible, and in certain cases to make simple records on square-ruled paper. Clay modelling and other manual occupations may be employed to test the accuracy of the impressions which the children form, and to fix them in their minds. Teachers also should frequently illustrate details of the lesson by blackboard drawings. Children who are jaded in five minutes by a lecture will be open-eyed and receptive for half an hour while the teacher draws as well as talks.

The attempt to teach children to be accurate in observation cannot be separated from the need of making them accurate in description. After the children have been trained to observe a fact they should be practised in making a correct statement of it in a sentence of their own. This oral answering in complete sentences will lead to correct use of the English language, both in talking and writing, and will store the mind with a useful vocabulary. In the higher standards the children will be able to write brief weekly compositions in which they may express in a written form the ideas which they have acquired through oral instruction.

To sum up the main value of Object Teaching, there are three principal uses. The first and most important is to teach the children to observe, compare, and contrast; the second is to impart information; and the third is to reinforce the other two by making the results of them the basis for instruction in Language, Drawing, Number, Modelling, and other Handwork.

There are, however, other important uses of good Object Teaching. It makes the lives of the children more happy and interesting by opening up an easily accessible and attractive field for the exercise of brain, hand, and eye. It gives the children an opportunity of learning the simplest natural facts, and directs their attention to external Objects, making their education less bookish. It further develops a love of nature and an interest in living things, and corrects the tendency which exists in many children to destructiveness and thoughtless unkindness to animals, and shows the ignorance and cruelty of such conduct. The value of the services which many animals render to man should be dwelt upon, and the importance of kindly treating them and preserving them should be pointed out. By these means, and in other ways, good Object Teaching may lay the foundation for the right direction of the activity and intelligence of the children throughout the whole school.

I have the honour to be, Sir, your obedient servant,

G. W. KEKEWICH.

## EXTRACTS from the REVISED INSTRUCTIONS issued to H.M. INSPECTORS, and applicable to the CODE of 1900.

### *Object Lessons for Country Schools.*

The farmyard. Its buildings and their contents. Animals kept on a farm and their uses. Necessity of cleanliness, kindness, and suitable food.

The dairy and its contents. Butter- and cheese-making.

Bees. Bee-keeping.

Spring. Spring flowers. Work in the fields in spring. The cuckoo and swallow. Record date of arrival.

Summer. Different kinds of leaves and fruit. Work in the fields in summer.

Autumn. Work in the fields.

A mill and the work of a miller.

Winter. Frost. Ice. Snow.

Birds. Singing birds, as the thrush and nightingale. Birds of prey, as the hawk. Swimming and wading birds, as the duck and heron.

Wild Animals. The fox, hare, and rabbit.

Minerals. A mine. Three useful minerals.

The lessons on the seasons should correspond with the actual seasons of the year, and the different operations explained should be taken while each is in progress.

Leaves of trees may be dried by simply placing them between sheets of paper and pressing them. Their shapes may be used for the children to draw round on paper, which can afterwards be pricked and then sewn round.

| | |
|---|---|
| Springtime. | The waking of Nature.<br>The lengthening daylight in the morning and evening, the coming warm weather, birds singing, building their nests, laying their eggs, the trees and hedges changing, buds and leaves, the bloom on fruit trees. |

The local wild flowers of spring. The daisy, primrose, bluebell.

Summertime.

The local wild flowers of summer.

Autumn.
The local wild flowers of autumn.
Winter. The repose of Nature.
The land. Woodland, meadowland, ploughland, moorland.
The sky.
A bird—covering, wings, beak, feet ; motion ; nests, eggs, food.
Local birds.
  - Thrush or blackbird.
  - Lark.
  - Robin.
  - Rooks.

Birds which come for the summer.
Birds which come for the winter.
Local wild animals.
  - Rabbit.
  - Hare.
  - Fox.
  - Hedgehog.

Animals on a farm.
Our village.
The carrier's cart.
The cottage garden.
The stream or river, its banks, the birds and animals that live near it.
A fish.
A plant.
The garden in spring.
The farm in spring.
The garden in summer.
The farm in summer.
The garden in autumn.
The farm in autumn.
The garden in winter.
The farm in winter.
The weather and wind.
The soil ; sunshine, air, rain, frost, manure.
The farmer's tools. The plough, drill, reaping-machine.
The crops ; grass, corn, root-crops.
Wheat.
The potato.
The oak tree.
The elm tree.
The apple tree.
Evergreen trees.
An insect.
The spider and his web.
The butterfly ; colours, beauty, history.
Bees.
The farmer's pests.
The farmer's friends.
A pond.
A frog.

A ramble in a wood and what may be seen there.
The railway.
Market-day in the neighbouring town.
A newspaper.

## EXTRACTS from other LISTS in the same "INSTRUCTIONS," suggestive of COUNTRY LIFE.

### *Plant Life.*

The study of plants as growing things.

Grow an onion in a bottle of water and note appearance of root and stem. Make a model in clay of the various stages of growth at short intervals.

Grow mustard seed on damp flannel and note stages of growth.

Notice a few curious roots.

The carrot. Cut off the top of one and grow it in a saucer of water. Contrast the root of a daisy (fibrous).

Roots which walk. Strawberry or strayberry.

Violet root.

Contrast root of Iris and Solomon's Seal in their modes of extension.

Stem. Count the rings in a trunk that has been felled. Rings, how produced; estimate age of tree; the record of wet or dry seasons.

Climbing stems. Ivy.

Train bindweed up a stick and note that it turns to the right. You unwind it and force it the other way (to the left), note how it resumes its old direction again, holding the stick with one of its leaf stalks to get a purchase for the change.

Simple experiments to show effect of light on (1) leaves and (2) roots. Celery; blanching.

Leaves of deciduous trees contrasted with leaves of evergreens. Contrast leaves of holly, ivy, and box with leaves of oak, elm, and beech.

Note autumn tints. Collect and press leaves of various colours in autumn.

Buds. Leaf buds and flower buds.

Parts of a flower. Flowers of curious shape. Pea blossom.

Fruits. Different kinds.

Insects and flowers. Colours of flowers.

Riverside plants.

Plants that grow in running water.

Plants that grow in still water.

Meadow and pasture plants. Turf on the downs, hay in the valleys.

Plants of the heath and moor.

Plants of the hills and woods.

Hedgerow trees—elms and ashes.

Trees of the forest—oak, beech, birch.

Evergreen trees—pines and firs.

Evergreen plants and shrubs—holly, ivy, box. Contrast evergreen and deciduous leaves.

Riverside trees—willows, poplars, aspens.

## *Animal Life.*

The Cat (compare with Dog).—Eyes, rough dry tongue, soft pads and sharp claws, teeth, method of holding prey, drinking, covering of fur, whiskers, tail.

The Cow (compare with Sheep and Goat).—How she takes her food, teeth, chewing, milk (cheese and butter), tail, hoofs, covering, ears, horns, nose.

The Horse (compare with Donkey).—Covering, teeth, hoofs, tail, mane.

The Rabbit (compare with Hare).—Teeth, legs, feet, claws, covering, tail, whiskers, ears, eyes.

The Mouse (compare with Rat and Water-Rat).—Teeth, paws, tail, whiskers, eyes, ears.

A Fish.—How fitted to live in water, weight, shape, covering, temperature, movements.

Animals which sleep in winter.—Examples: squirrel, dormouse, common snake, frog, toad, snail, slug. Preparation made for sleep.

Mole.—Shape, snout, teeth, paws, claws, eyes, ears, fur, food.

Hedgehog.—Covering of spines, how it rolls itself into a ball and why, head, teeth, food.

Common Snake (compare with Viper).—Shape, covering, teeth, how it moves, how it swallows its prey.

Frog (compare with Toad and Newt).—Movement, capture of prey, breathing, winter quarters.

Garden Snail (compare with Slug).—Shell, mantle, head, horns, eyes, food, preparation for winter sleep.

Earth-worm.—Shape, rings, locomotion, food, usefulness.

Spider (contrast with Bee).—Shape, segments, legs, eyes, jaws, spinnerets, web, breathing organs.

Paws and Claws and their uses.—Cat, dog, rabbit, mouse, mole, frog.

Tails and their uses.—Horse, cow, donkey, dog, cat, monkeys, harvest mouse.

Tongues and their uses.—Cat, dog, cow, woodpecker, frog.

Teeth and their uses.—Man, cat, cow, horse, rabbit, snake, fangs of poisonous snakes.

Hair, Fur, Wool, and their uses.—Cat, mole, dog, sheep, fox.

Beaks of Birds and their uses.—Duck, fowl, parrot, sparrow, goat-sucker, heron.

Feet of Birds and their uses.—Duck, fowl, swift, owl, etc.

Insects.—Examples: Bee, beetle, butterfly, cockroach, silkworm. Insect development, legs, wings, segments, mouth, breathing apparatus, ovipositors.

### *Natural Phenomena.*

**The Sky.**—Sunrise, noon, and sunset. (Note the object over which the sun is seen to rise from month to month. Note sun's position at noon, and its varying height above horizon.)

Shadow. (Note by aid of a spike erect on a flat disc the varying length of the shadow at noon. Study the shadows of objects. Variation in sharpness and depth.)

Moon. (Note the changes. Draw the shape from week to week.)

**The Air.**—Wind. Varying direction. (Note and keep record of the direction of the wind from day to day.)

Warmer and colder winds ; rainy and dry winds.

Moisture in the air shown by seaweed ; string (changing tension).

Wet cloth dries in the wind (water turns to vapour).

Vapour turns to water. (Breathing on slate. Clouds on hills. Evening mists.)

Clouds in the sky. Three chief kinds: "heaps," "beds," "feathers."

Rain. (Note size of drops. Raindrops on dust form little balls. Note effect of heavy rain in tearing up roads. Note the channels so made, and the arrangement of the sand and pebbles washed to a distance.)

Rainbow. (Note the succession of colours. Note position of sun behind observer and of the bow where the shower of rain is falling. Note that height of arch changes. When is it higher and when lower ?)

Rainbow colours on shells, film of tar, etc. Feathers of birds.

# BOOK II

# LESSONS FROM ANIMALS

## DOMESTIC ANIMALS

### Lesson I

### THE CAT

Have ready for illustration : a living cat, and Brown's pictures to show the structure, as it is described. The teacher should cultivate the power of showing the various parts by black-board sketches. Provide also a saucer of milk.

*The purpose of this lesson is to deal with the structure of the animal, and such simple habits as must have come under the children's own observation.*

*The killing propensities and the habits dependent thereon will form the subject of the second lesson, and that will be the best time to show how completely the structure and habits of the animal, as a whole, are in harmony.*

*Ask one of the children to bring a quiet, gentle cat for the occasion.*

*Any child will be pleased to do this, especially if the request is coupled with the prospect of sitting in front of the class, to take care of pussy, and keep it quiet during the lesson.*

*After introducing the animal, proceed to examine it, point by point, in some such way as this:—*

## I. THE BODY

1. ITS BUILD.—*Stand the cat on the table while the body is examined. Call attention to the build of it. Elicit as much as possible from the children themselves, step by step.*

The body is **long** and **slender**, but **deep**. It is not raised very high above the ground, as **the legs are rather short.**

*Tell that it is* **very lithe** *and* **supple in its movements.** *It can easily twist and turn in any direction. Perhaps some of the children may have seen the cat on a shelf, or on the kitchen dresser. Unless we frighten her, she rarely or never breaks anything there, although she has to thread her way through crockery-ware and glass.*

2. ITS COVERING.—*Turn next to her coat, and, as before, let the children describe it.*

It is a **thick, soft, glossy fur** (black, white, or tabby, etc.). The cat takes great care of her beautiful coat.

She never lets it get dirty or matted together. She often washes it, although she never goes near the water, for **cats do not like water on their fur.**

How does she wash it? She washes it **with her tongue and paws.**

A lady likes to have a jacket made of thick, soft fur.

When does she wear her fur jacket? In the **cold weather** and **on cold nights.**

Why? Because **it keeps her warm.**

Then what sort of coat does pussy's fur make? A **nice warm coat.**

*Stroke the cat. Tell that she seems pleased when we stroke her fur the right way, but worried* **if we stroke it the wrong way.**

*Ask the children to take notice next time they see a cat meet a strange dog. They will then see her with her* **back arched** up, *and* **her fur** *no longer smooth*, **but ruffled** *and* **standing on end.**

*This always happens when she is frightened, and it shows how much she is afraid of the dog.*

*Take up a fold of the cat's skin in the hand, and point out that instead of being tight like ours,* **it hangs loose about her body**. *Explain that this loose skin is a great help to the cat in her movements.*

3. THE TAIL.—*Notice next the long, slender tail.*

Puss is sitting quietly now, **with her tail curled up** round her feet.

When she walks about she usually **trails it behind her**.

Did you ever notice her tail when she comes to meet you in the morning? Yes; she then **carries it almost upright and stiff.**

*Explain that this is her way of showing that she is pleased. She rubs her soft fur coat up against us, and begins to purr or sing. She means to say "Good morning; I am so glad to see you."*

Did you ever see her **lash her tail** from side to side? Yes; she always does that **when she is frightened** or **angry.**

**The tail**, as well as the fur, tells us **whether the cat is pleased or angry**.

## II. THE HEAD

*Call upon the children, in the next place, to examine and describe the head.*

It is **round in shape**, and **small** compared with the body. It has a **short, snub nose**, but the **mouth** is very **large and wide**, as we may see when the cat yawns.

1. THE TONGUE.—Puss has been very good. She shall have this saucer of milk now.

Watch how she drinks it. She does not drink as we do; she **laps it with her tongue**. The **tongue is long and fleshy**; just fitted for lapping up liquids.

2. THE EARS.—While she is finishing her milk, let us turn our attention to her ears.

*Notice that these are* **erect, wide open,** *and* **pointed**; *and that she can turn them quickly in any direction. Call her, and notice how she* **pricks up her ears.**

Cats are **very quick at hearing**.

3. THE EYES.—*Bring a child to the front, and call attention to the round, black spot in the centre of his eye.*

That black spot is the **pupil of the eye.** Light enters the eye through the pupil, and not through any other part of it.

The **coloured part** of our eye all round the pupil is really **a sort of curtain, to shut out some of the light,** when it is too bright.

*Lead the children to tell that, when the sun is shining very brightly into our windows,* **we pull down the blinds** *to shut out some of the light.*

*We could not see if the light was too bright;* **it would dazzle our eyes.**

Now look at pussy's eyes. The **pupil** of her eye is

**not round** like ours. It is **a long, narrow slit.** The light now is too bright for her, and so **the curtain closes up,** and **leaves only this very narrow slit.**

As evening comes on, this slit opens wider and wider —**the curtain is drawn aside**—to let in as much light as possible. At night the curtain is drawn back **to the very edge of her eye,** so that the eye becomes then **a great round window,** ready to take in all the light there is.

*Perhaps some child may have come across the cat in the cellar, or in some other dark place. Ask him to tell what her eyes look like then.*

They look like **round, blazing balls of fire** then. The cat can see well where we should be groping about in the dark.

4. THE WHISKERS.—*Call attention to the* **bare patch** *on each side of the mouth, with* **the long, stiff hairs** *or* **whiskers** *standing out from them.*

*Tell the purpose of these.*

The ends of these hairs **act as feelers,** and are a great help to the cat in the dark. With them she is able **to feel her way along,** when it is too dark even for her to see.

*Show that these stiff hairs* **stand out a long way** *on either side.*

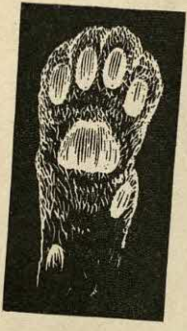
The head is very small compared with the body; but she knows that if she can put her head into any place **without touching her feelers,** there is room for her whole body.

### III. LEGS AND FEET

1. THE LEGS.—*Point out that the legs although* **slender** *are* **very strong**—*the hind-legs are more strongly built than the fore-legs.*

The cat's legs are specially **fitted for leaping** and **springing.** She is also a **splendid climber.**

*Picture her climbing up the trunk of a tree. She is as much at home there as she is on the ground. She jumps down from a high wall, but she* **never shakes or hurts herself**, *because her* **bones are very loosely jointed.**

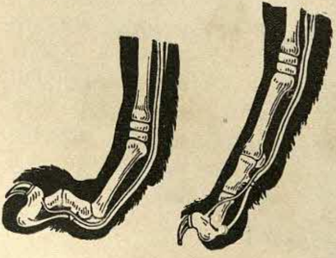


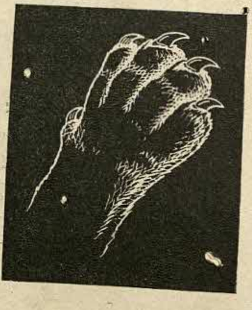
2. THE FEET.—*Pass on next to examine the cat's feet. Point out that the* **front paws have five toes**, *the* **hind ones four.**

*Call attention to the* **soft, smooth pads** *on the bottom of the toes. Count them. There are* **seven of these pads** *on the* **front paws,** *and* **five** *on the* **hind ones.**

The cat **walks on her toes,** not on the sole of her foot as we do. She is a **toe-walker.** As she walks on these padded toes, **she never makes a sound.** She moves about with a **gliding, stealthy, noiseless step,** wherever she goes.

3. THE CLAWS.—Did you ever notice her paws when she was angry? Yes; she darts out her **sharp claws** then. If we tease her and make her angry, she will scratch us with them. Each toe is armed with a **strong, curved, pointed claw.**





Where are her claws now?

*Tell that she is able to* **draw them up** *or* **thrust them out** *when she pleases; that they are now drawn back, and* **covered up in a sort of sheath.** *She is not angry now.*

*Explain that these sharp claws are very useful to the cat* **in climbing trees.**

*She keeps them drawn back in their sheaths as she walks about, so they* **do not get blunt by rubbing against the hard ground.**

Who has seen the cat scratching against a tree, a fence, or even against the legs of the furniture?

Do you know what she is doing? **She is sharpening her claws.**

### Summary of the Lesson

1. The cat's body is very lithe and supple in its movements.
2. It has a warm coat of fur, and a very loose skin.
3. The cat shows whether it is angry or pleased by means of its tail.
4. The cat laps its drink with its tongue.
5. Its ears are very sharp, and its eyes are made to see well, when it is too dark for most other animals to see at all.
6. The feelers serve instead of eyes when it is very dark.
7. The feet are padded, and the claws are protected by sheaths.
8. The cat is a good climber.

## Lesson II

## CATS AS KILLING ANIMALS

Provide for illustration: the living cat and pictures used in the last lesson, a piece of meat, some biscuits, some milk, and pictures of the tiger, lion, and any other of the fierce cats.

## I. INTRODUCTION

1. WE gave puss a saucer of milk the other day, and watched her drink it by lapping it up with her tongue. To-day she shall have something to eat, for I want you to know how she eats, as well as how she drinks.

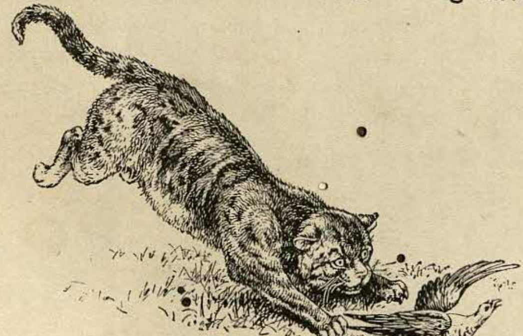
You know we give her all sorts of scraps from the table. She will eat almost anything.

But what kind of food does she like best? She likes **the flesh of mice and birds** better than anything else.

*Picture the cat watching patiently and still at a hole for a mouse, or stealing quietly along after a bird. She looks anything but a gentle playful children's pet just then.*

2. *Lead the children to tell of* **the fierce, glaring eyes, the moving tail, the body drawn up ready to spring forward.** *The mouse comes out—there is a sudden rush. With sure aim she leaps, and catches it in her claws.*

*Then show the gentle, purring pussy of half an hour ago* **changed into a fierce monster, growling savagely,**



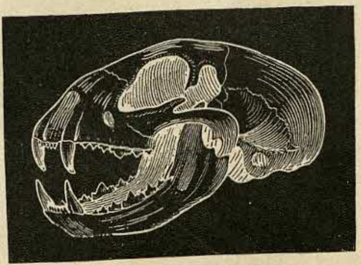
*and taking pleasure in cruelly torturing the little creature she has caught, till at last* **she tears it in pieces,** *and* **eats it up, flesh, bones,** *and* **all.**

All this seems very dreadful and very cruel, but the cat does it **because she was meant for it** and **made for it.** Let us see how this is.

## II. THE CAT'S TEETH

1. *Show these in the picture, or by means of a black-board sketch, or better still with the help of an actual skull if it can be obtained.*

There are **six small sharp teeth** in front of each jaw. Beyond these on either side is **a long, powerful, pointed tooth,** which bends backward slightly; and beyond each of these again are **four large teeth with sharp points on the crowns.**



*Give the cat a piece of meat now, and let her eat it while the children look on. Call attention to the way in which she presses it down with her fore-paws, while with her head on one side* **she tears it to pieces with those long, sharp, tearing teeth.**

2. The teeth behind these are not broad and flat on the top like ours; they have sharp, cutting edges, which **overlap like the edges of a pair of scissors.**

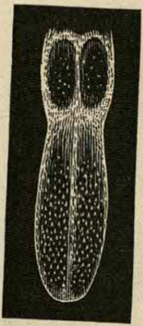
*Explain that the cat* **does not chew** *or grind up her food as we do. She cuts and* **chops it up** *with those sharp teeth, and* **swallows it in lumps.**

*Set one of the children to eat a biscuit or a piece of bread, and notice the movement of his jaw.*

The cat has no teeth for chewing. **The jaw has only one movement**—up and down; **it cannot move from side to side,** as our jaw does when we eat. Such teeth are fitted **for eating flesh.**

## III. THE CAT'S TONGUE

*Get the cat to lap a little milk out of the hand of one of the children, and call upon him to tell what he observes.*



The cat's tongue **feels rough**; it **scrapes his hand.**

*Tell that the tongue really is rough. It is* **covered with small, sharp, horny points,** *which stretch backwards.*

When the cat has a bone, she tears off as much of the flesh as she can with her teeth, and then she **scrapes the rest off clean by licking it with her rough tongue.**

*Show, if possible, a bone which has been stripped clean by a cat.*

## IV. THE CAT IS FORMED TO KILL

1. The cat, then, was meant to live on the flesh of other animals. But she must catch the animals before she can eat them. Let me show you that she is made for this too.

*Picture the mice—very sharp, very frightened.*

What would they do if they could hear pussy's feet trampling on the floor?

But they do not hear her. Why? Because her **feet are padded** with soft pads. She creeps along on her padded toes **without making any noise.**

2. The instant the mice catch sight of her they run away, but although they are very sharp, she generally manages to catch them before they get to their holes.

Why? Because her body and legs are **made for leaping and springing.** She darts forward with a sudden spring, and catches them.

How does she catch them? She **thrusts out her long,**

**sharp claws** as she springs, and catches the mouse with them. **Those sharp claws were meant for this.**

3. *Point out that perhaps puss may prefer a bird for dinner instead of a mouse, and birds live in the trees. Her sharp claws then* **serve the double purpose** *of helping her to climb the trees as well as catch her prey.*

**No other sort of feet would do for an animal like the cat.**

### V. A NIGHT-PROWLER

1. When do the mice come out of their holes? At night when all is quiet. The night, then, ought to be pussy's **best hunting time.**

Should you like to go about looking for something in the dark? No; we could not see in the dark.

*This will be quite sufficient hint to lead the children to discover for themselves the connection between the eyes and the other special characteristics of the cat.*

The cat is meant to be a night-prowler. She hunts her prey in the dark. **She requires eyes for seeing well in the dark,** or she would never be able to catch her prey.

2. *Remind the children that when she is waiting and watching for her prey, she often has to make her way* **through very narrow places,** *where it is too dark for even her sharp eyes to see. She must not make the least noise, or the mice will hear her. How does she manage then?*

**Her whiskers act as feelers. She feels her way where she cannot see.**

3. The mice live in their holes. They are quite safe there, for the cat cannot get near them.

How does she know they are there? She can hear them squeak, and she waits patiently for them to come out.

**Sharp ears,** then, as well as **sharp eyes,** are **necessary for this night-prowling cat.**

4. *Lead the children next to tell that, if we are out late at night, we always take care to wrap ourselves up warm. It is much colder at night than it is in the daytime.*

The cat has a **thick, warm, fur coat,** because it was **meant to be a night-prowler.**

To sum up then. The animal's teeth show that it was meant to be **a flesh-eater.** It must hunt its food before it can eat it. Its **body, legs,** and **feet** make it **a hunting animal.** It hunts its prey at night. Its **eyes, ears, whiskers,** and **covering** fit it for **a night-prowler.**

## VI. OTHER CATS

*Picture to the class some cats that live wild in far-off lands. Lead them to imagine an animal* **many times bigger than pussy,** *but with* **the same powerful eyes** *for seeing at night,* **the same padded feet,** *the* **same sharpened claws,** *the* **same terrible teeth**; *in fact, the* **same animal exactly,** *but many times larger and stronger.*

The fierce beasts always sleep in their dens all day long, and **at night come out to prowl through the forests in search of their prey.**

The **tiger** is most like the cat—indeed he is an immense cat.

*Show the picture of the tiger in the jungle, and give a rough idea of his size. Call attention to his* **beautifully striped coat.**

*The* **lion** *is another of these* **great cats.**

*Show the picture and call attention to the* **thick, shaggy mane,** *which we do not see in the tiger.*

These fierce cats are so very strong that **they prey upon animals as large as the horse and cow.** Sometimes they spring upon a man, and carry him off in their strong jaws.

### SUMMARY OF THE LESSON

1. The cat is a killing animal; it is formed to kill.
2. The teeth act like the edges of a pair of scissors.
3. The jaw has only an up-and-down movement.
4. The tongue is rough. The cat scrapes the flesh off a bone by licking it with this rough tongue.
5. The cat is formed for night-prowling.
6. Lions and tigers are great cats.

# Lesson III

## THE DOG

The teacher should be provided with Brown's picture of "The Dog, and details of the structure," as described in the lesson.

### I. INTRODUCTION

*INTRODUCE by calling upon the children to tell all they can of the dog, its nature and habits.*

It is one of the most sensible animals, and is so gentle and obedient that it can easily be taught. No animal is more loving and faithful to its master than the dog.

*Compare the dog and the cat in disposition.*

The cat seems to learn to love the house rather than the people in it; but the dog cares little what the place may be, so long as he can be near his master.

How does the dog behave though when he meets a strange cat?

### II. THE BUILD OF THE DOG

1. THE BODY.—*Call attention to the picture, and point out that the dog is* **longer, broader, deeper-chested,** *and generally speaking* **more strongly built** *than the cat.*

*Lead the children to think of their own chests, and the lungs inside them for breathing.*

What happens when we run very fast? We **breathe quickly.**

Why? Because we want more air; **we get out of breath.**

Which would make the best runner, a boy with a big chest, or a boy with a small, narrow one? The boy with **a big chest.**

Why? Because the big chest **would take in more air** than the small one.

Now think of the dog with his broad, deep chest. Would you expect him to be a good runner? Yes.

2. THE LEGS.—What else must a runner have besides a big chest? **Long, powerful legs.**

Let us examine the dog's legs then, and see whether they are made for running.

*Point out that the legs are* **slender** *in build, but* **very strong.** *They are* **much longer than the cat's legs;** *they are* **made for running.** *The legs as well as the chest of the dog prove that he was meant to be a running animal.* **The dog is one of the swiftest of runners.**

3. THE COVERING.—*Show that the* **dog's skin,** *like the skin of the cat,* **hangs loose** *about the body. It is covered with* **hair, not fur.** *Some dogs have* **long, shaggy hair,** *others have* **a close, short coat.**

*Elicit that cats never go near the water, even to wash themselves; they dislike water on their fur; but* **dogs seem to love the water,** *and most dogs are* **splendid swimmers.**

*They soon* **shake themselves dry** *when they come out of the water, but if the cat's fur gets wet,* **it clings about the body,** *and makes her uneasy.*

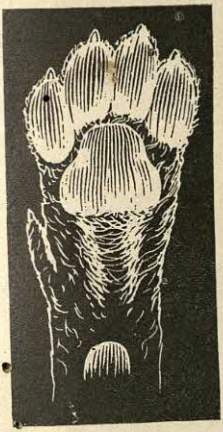
4. THE TAIL.—*Lead the children to compare the dog and the cat with respect to the use they make of their tails.*

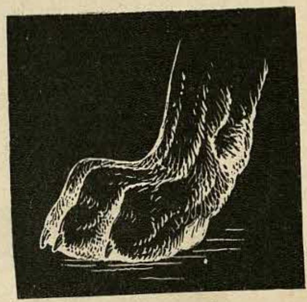
*Both use their tails* **to show whether they are pleased**

**or angry.** *The dog* **wags** *his tail* **when he is pleased,** *and* **drops it** *between his legs* **when he is in disgrace.**

He usually **trails it** after him **as he walks,** but **it stands out stiff when he runs** very fast.

5. THE FEET.—Like the cat, he has **five toes** on the **fore feet,** and **four** on the **hind ones**. The toes too are





padded; for the dog, like the cat, **walks on his toes.** Each toe has **a strong, slightly curved claw.**

Now I want you to think for a moment about the cat's feet. When puss lies quietly on the rug in front of the fire, where are her claws? She has them **drawn back in a sort of sheath.**

Are they always in the sheath? No; she **sends them out when she is angry.**

What does she do with them when she is walking? She keeps them **drawn up.**

The dog **cannot draw his claws back** in this way, even when he walks. Although his feet are padded, **the ends of the claws rub the ground** at every step.

The dog, then, **has not the quiet, noiseless step of**

**the cat,** and his claws, from constantly rubbing on the ground, **are always blunt,** and **not sharp like those of the cat.**

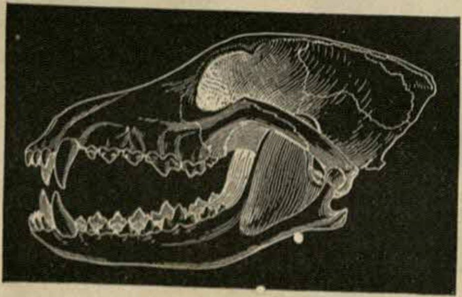
*Lead the children to think about the dog's habit of burying bones.*

He makes a hole in the ground, and hides away the bones till he wants them. It is with these strong claws that he **scratches and digs.** They seem to be made for this purpose more than for seizing and holding.

6. THE HEAD.—The dog has a larger and more pointed head than the cat. The lower jaw is very strong and has **only one movement,** up and down.

*Draw a rough sketch, or show a picture of the dog's skull and teeth.*

The teeth are sharp and pointed. They are **exactly like the teeth of the cat.** They are made for cutting through flesh, not for chewing or grinding.



The dog is a flesh-eater. Like the cat **he does not chew his food.** He simply cuts or chops it up with his sharp teeth, by means of the **up-and-down movement of the jaw.**

*Picture a dog seizing a rat or some other animal. The cat seizes its prey* **with its sharp claws,** *but the dog's claws are blunt; they are not fitted for seizing. He snaps at the rat with* *his open mouth, and catches it and holds it fast* **with his four long, sharp-pointed teeth**.

7. THE TONGUE.—The tongue is not at all like the cat's tongue. Tell me how we describe the cat's tongue. It is dry and rough, **covered with sharp, horny points.**

The dog's tongue is **soft, smooth, and wet.** He does not use it as the cat does. He runs (particularly when the weather is hot) with his tongue hanging out of his mouth. If you watch you will see **water dropping from it.** I wonder what that means.

What happens to you when you run? You get very hot, and covered with little drops of moisture, which we call sweat or perspiration.

The dog's body never sweats or perspires, but when he gets hot, **all the moisture comes out through his tongue,** and as this moisture dries up, the dog's body gets cool.

You will know now why, on a hot summer day, you often see a dog lying down **with his tongue lolling** out of his mouth.

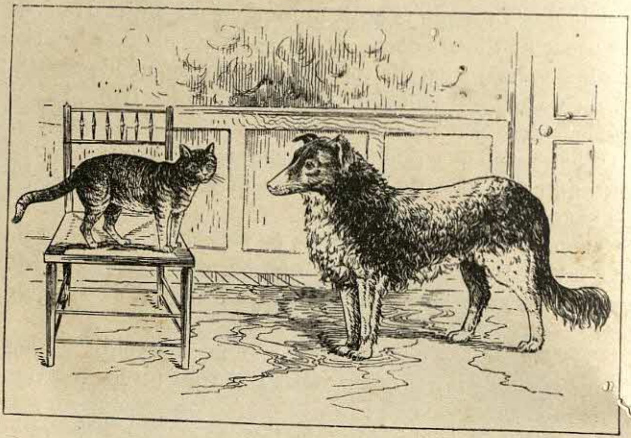
*Lead the children to tell how the cat and the dog drink. Both animals are alike in this. They do not drink as most animals do.* **They lap up the water with the tongue.**

8. THE EYES.—The dog is **not a night-prowler.** His eyes are not made for seeing at night. They are **not shaded by a curtain** in daylight. For the same reason he **has no need of feelers** for feeling his way in the dark; hence his whiskers instead of standing out like long, stiff, coarse bristles, are **short, fine hairs.**

## SUMMARY OF THE LESSON

1. The dog is a running animal; it is made for running.
2. The dog shows whether it is pleased or angry by means of its tail.

3. The dog's feet are padded; but the claws cannot be drawn back. They have no sheath.
4. The dog seizes its prey with its teeth.
5. The dog laps water with its tongue.
6. The dog is not a night-prowler. There is no curtain to shade its eyes.



## Lesson IV

## RECAPITULATION—THE CAT AND DOG COMPARED

*It will be interesting and instructive to devote the time of a lesson now entirely to a recapitulation of what has already been taught about these two animals.*

*Deal first with the build, and then with the habits and character of each, leading the children themselves to tell that the difference in nature is dependent on the difference in build. As point by point is made, let it be set out in a few words on the black-board.*

## I. BUILD

| | CAT | DOG |
|---|---|---|
| 1. Eyes . . | Curtain to change size of pupil. Sees well at night. | No curtain. Does not see well at night. |
| 2. Whiskers | Long stiff feelers, to feel the way in the dark. | Short fine hairs — useless as feelers. |
| 3. Covering | Thick soft smooth fur. | Coarse hair. |
| 4. Body . | Long and slender, for easy gliding movement. | Long, broad, deep-chested — for running. |
| 5. Legs . . | Short—made for creeping slyly about. | Long and powerful—made for running. |
| 6. Feet . . | Paws with soft pads, sharp claws in sheaths. Walks without a sound. | Padded paws, blunt claws, which cannot be drawn back — no sheaths. Claws touch ground in walking. |
| 7. Head . | Small and rounded in shape. Sharp, erect ears. | Large and long. Keen sense of smell. |
| 8. Teeth . | Made for tearing and cutting—not for chewing. Jaw moves in one direction only—up and down. | Made for tearing and cutting. Powerful jaws for crunching bones—move up and down only. |
| 9. Tongue . | Rough and dry — sharp horny points for stripping flesh from bones. Drinks by lapping. | Soft, smooth, and wet. Lolls out of mouth. Perspires through the tongue. Drinks by lapping. |
| 10. Tail . . | Lashes it in anger. Waves it to and fro when watching its prey. | Wags it when pleased. Carries it out stiff when chasing prey. |

### II. CHARACTER AND HABITS

*Proceed next to show that as the two animals differ in structure, so as a natural consequence they also differ in their life, habits, and nature.*

*Picture the cat at night,* **creeping about stealthily** *with noiseless step, and* **watching patiently at a hole** *for a mouse. She is formed for this; but it makes her* **sly and cunning** *in catching her prey, and when she has caught it, she takes a delight* **in cruelly torturing it** *before she kills it.*

*Tell how differently the dog acts under like circumstances. Show him a rat hole, and instead of sitting down quietly and patiently for the rat to come out, he at once begins to* **tear wildly at the hole with his strong blunt claws,** *barking furiously all the while, till he finds his prey. But then* **he gives one bite** *with his strong jaws, throws the rat over quite dead, and leaves it.* **He never thinks of torturing it, and playing with it** *before he kills it, as the cat does.*

## Lesson V

## KINDS OF DOGS

Provide Brown's pictures of all the dogs named in the lesson.

*CALL upon the children to name the different kinds of dogs they have seen, and so lead up to some such classification as follows:—*

### I. THE HOUNDS

*Show pictures of each of these, as the lesson proceeds. These dogs are all used by sportsmen. They are all* **swift runners,** *and most of them have a very* **keen sense of smell.**

1. The Grey-hound.—*Notice the* **long slender body and legs**; *the* **long pointed head and muzzle.**

Such an animal is built for speed. The long legs and body tell us that it can **run very fast.**

But look at the picture again, and tell me whether you think this dog could run a long way. What do you think? Yes; it could run a very long way without getting out of breath.

THE GREY-HOUND.

How do you know that? Because it has a **large deep chest.**

*Tell that this dog has* **wonderful running powers.** *It chases its prey* **by sight.** *Explain the meaning of this, and then proceed to show that such a dog* **does not require the keen scent** *which some dogs have.*

It **runs its victim down,** keeping it **in sight** all the time.

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The grey-hound is used for hunting the hare (a very swift animal).

2. The Scotch Deer-hound is one of the largest and strongest of the family. It stands about two feet four inches high at the shoulders, and has a rough, shaggy coat.

3. The Fox-hound.—There are two varieties of this dog, one larger than the other. The larger and more powerful dog is now **used for stag-hunting** in England, instead of the real stag-hound. The smaller dog is the one **used for fox-hunting.** These dogs **hunt by scent.**

THE FOX-HOUND.

*Tell that in some parts of the country the* **Otter-hound** *is used for* **hunting the otter**; *the* **Dashund** *for hunting the* **badger.** *There is also a very large, powerful dog known as the* **blood-hound,** *which has a wonderful power of scent. This is sometimes used for* **tracking men.**

## II. THE SPANIELS

*Note the characteristics of these dogs. They are clothed with long hair, mostly curly or wavy. The ears are large and pendent.*

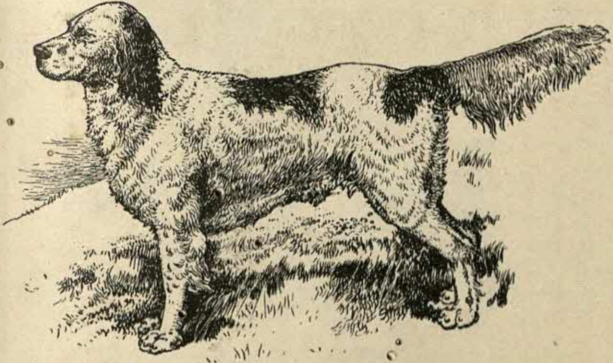
1. THE SAINT BERNARD is the grandest of these dogs. *Show the picture. Describe the power of this dog in finding people who have been lost and buried in the snow.*

2. THE NEWFOUNDLAND DOG is another very large and powerful spaniel. This dog is a fine **swimmer,** and is very fond of the water.

*Tell some stories showing the usefulness of the Newfoundland dog in saving people from drowning.*

The pretty little **King Charles' Spaniel** is another member of the family; and so are **the Setters**—dogs used by sportsmen.

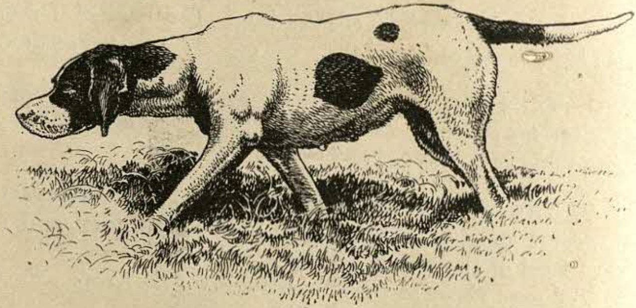
The **Setters** and **Pointers** are both sporting dogs.



THE SETTER.

When the shooting season comes round these dogs go out with the sportsman **to find the quarry.** The **setter is a sort of spaniel;** the **pointer belongs to the hounds.** Both depend upon their sense of smell.

*Both follow the* **"body-scent," not the foot-scent** *of their prey as the fox-hound does. Explain this.*

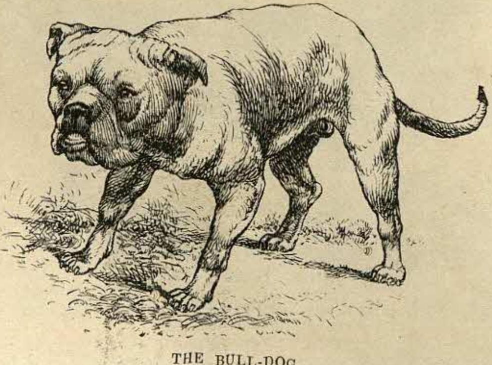


THE POINTER.

**The Mastiff** is another noble and powerful dog. He makes a **splendid watch-dog.**

## III. Bull-Dogs

*Show the picture of the bull-dog. Note the massive build*



THE BULL-DOG.

*of body, head, and legs. Tell that although somewhat ugly, he is as a rule very gentle.*

Besides the common **Bull-dog** there is a smaller dog of the same family, known as the **Bull-terrier**.

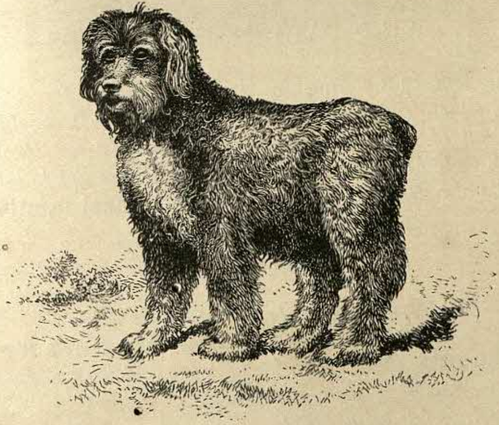
They are all very clever, sensible dogs, and are mostly kept as watch-dogs.

The real **terriers** belong to another family. They are used mostly in **rat-catching.**

### IV. THE SHEEP-DOG

**The Scotch Collie** is the **handsomest** of these sheep-dogs. It has a beautiful silky coat, with a ruff round the neck, and a bushy tail. Show the picture.

These sheep-dogs are specially trained for their work early in life.



THE BOB-TAILED SHEEP-DOG.

They are the most sensible and faithful of all the dogs.

*Tell some stories to illustrate the character of these dogs.*

But the **Bob-tailed Sheep-dog** is the one most commonly kept by the English farmer. It is a **rough, shaggy-coated dog,** smaller than the collie.

### SUMMARY OF THE LESSON

1. Hounds are hunting dogs. Grey-hounds hunt by sight; Fox-hounds by scent.

2. The Saint Bernard and the Newfoundland are the largest and noblest of the spaniels.

3. The Setter and Pointer are sporting dogs.

4. The Mastiff, Bull-dog, and Sheep-dog are very sensible and very useful.

# WILD ANIMALS

## Lesson VI

## WILD CATS OF THE WOODS

*THERE will be no difficulty in borrowing a ferret for the lesson, either from the farmer or the keeper. It should not be taken out of its cage, and the children must not touch it, for even in their half-tame state, these animals are apt to be vicious. Provide also Brown's picture of* **"The weasel family."**

### I. INTRODUCTION

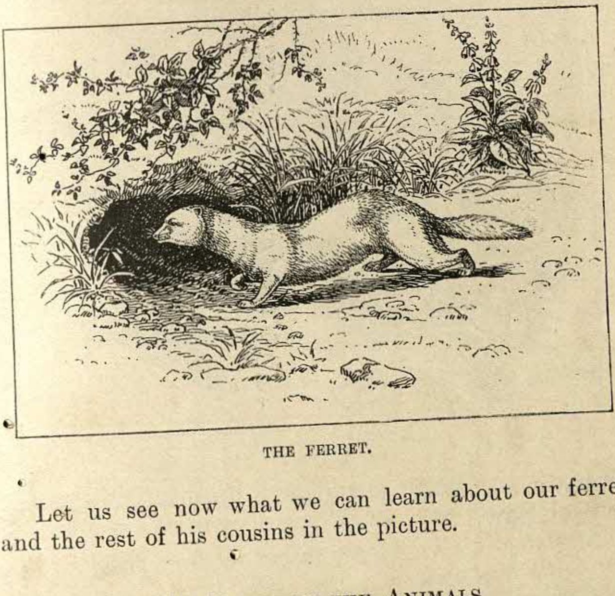
1. *Show the animal in its cage, and tell its name. Some of the boys probably know that the farmer keeps ferrets* **for hunting the rats,** *that infest his rick-yard and the buildings near. Most likely some of them have watched the sport.*

*Elicit, or tell all about it.*

2. *Explain that this little animal has several cousins, and that they are all very much alike, both in size and appearance, and also in their nature.*

The **ferret, marten, weasel, pole-cat** and **stoat** all belong to one family. We call them **the weasel family.** They are all small animals, although the marten and the pole-cat are larger than this ferret. But they are all **fierce flesh-eaters—a sort of wild cat.**

3. *Show the picture of the weasel family, and compare the animals with the ferret in the cage.*



THE FERRET.

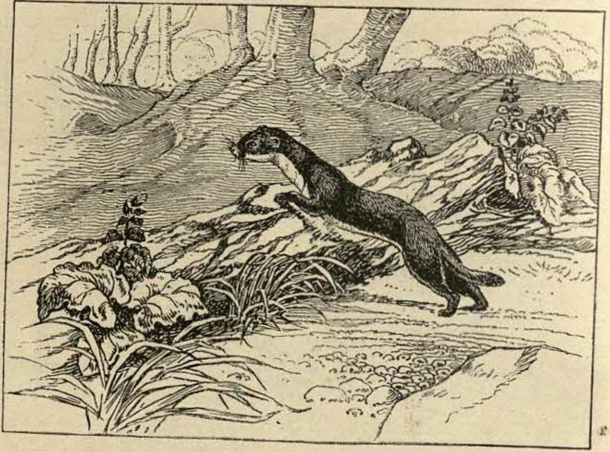
Let us see now what we can learn about our ferret, and the rest of his cousins in the picture.

## II. Build of the Animals

1. The Body and Legs.—*By referring to the picture and the living animal, lead the children to notice that in all of them* **the body is very long and slender,** *and that it is supported on very* **short legs.** *Compare with the cat, whose body is also very close to the ground. Tell that, although so slightly built, these animals are* **very muscular and strong,** *and so supple in their movements that* **they can twist about** *with the greatest ease, and wind themselves through very small holes.*

They can **run, leap, climb,** and even **swim.** *Compare* *with the cat. Remind the children that the cat is unlike them in one point. It will not go near water; it has a great dislike for water. It cannot bear to get its fur wet.*

2. *Pass on to notice the feet next. Point out that the feet* *are* **paws,** *like those of the cat, except that there are* **five toes on each paw.**



THE WEASEL.

*Elicit that the cat has five toes on the front paws, but only four on the hind ones.*

*Show next that the toes are all armed with* **sharp, strong claws** *for seizing.*

*Tell that nearly all the weasel family are* **good climbers.** *They can even* **run up the perpendicular trunks of trees** *with perfect ease. Compare them with the cat again in this respect, and lead the children to tell how well fitted such feet are for this climbing work.*

3. Some members of the weasel family have retractile claws like those of the cat; but most of them are **unable to draw the claws back,** and **have no sheath** for them.

*Elicit that in this they resemble the dog rather than the cat. Tell that all the family are* **toe-walkers.** They place only the tips of the toes on the ground in walking. *Compare again with the cat and the dog.*

4. *Turn to the picture once more, and point out that the marten and the pole-cat have* **large bushy tails.** *Compare these with the* **tails of the ferret, stoat, and weasel,** *which are much smaller—more like the long thin tail of the cat.*

THE STOAT (in summer).

5. *Lastly, notice the* **soft, smooth, silky, fur coat** *of the ferret in the cage, and explain, with the help of the picture, that all the family are clothed in rich soft fur like this.*

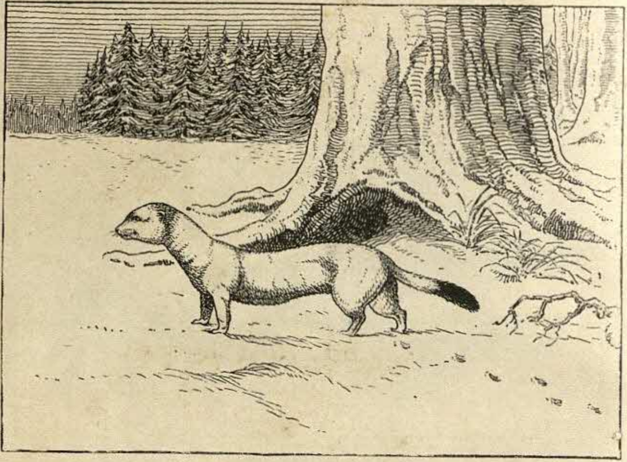
*Say a few words about the fur of the stoat. In the summer time this animal's coat is brown like that of the weasel. But as winter approaches,* **it changes colour,** *and becomes* **white.**

*This white winter coat of the stoat is the beautiful much-valued fur called* **ermine,** *which is used for trimming and lining the robes of the judges and nobles of the country.*

1. THE HEAD.—*Point out that the* head is small, rather

long, and somewhat flat. It is joined to the body by a long neck, which is **nearly as thick as the body itself.** *Tell that with such a neck it can* **turn and twist its head about** with the greatest ease.

The **ears** are **small and erect—very sharp** of hearing; and the long pointed nose, with its wide-open nostrils, shows that these animals have **very keen scent.**



THE STOAT OR ERMINE (winter).

2. *Notice the eyes next.* They are **small,** but exceedingly **sharp and bright,** and very **restless.**

Some people have small, sharp, restless eyes something like these. We commonly speak of them as ferret-eyes.

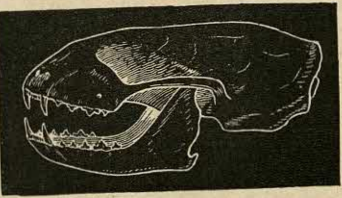
*Tell that all these animals are* **night-prowlers,** *like the rest of the cats. They sleep by day, and hunt their prey at night. Let the children compare the eyes of the night-prowling cats with the eyes of the dog. Dogs' eyes are not shaded by a curtain.*

3. How do the night-prowlers find their way about in

the dark? They use their **long stiff whiskers** as **"feelers."**

*Show that these* wild cats *have long stiff whiskers or* **"feelers,"** *as well as our common cat.*

4. *Lastly, show a picture, or a black-board sketch, of the skull and teeth of one of these animals. Notice point by point, and lead the children to observe and tell that in every respect this is the head of a flesh-eater.* The **jaws** are **very strong,** and the **teeth** are made for **cutting through flesh**—not for chewing.



*Tell that, as in the case of the cat and dog, the* **jaw has only one movement**—*up and down.*

The **tongue** of these animals is **not rough** like the cat's tongue. It is more like the smooth tongue of the dog.

## III. Habits and Nature

1. *Refer to the weasels again as night-prowlers. Tell that they live* in pairs *in holes in the ground, in hollow trees in the woods, and among the rocks.*

There, in their snug nests of dry leaves and moss, they rear their litter of young ones—three, four, or five at a birth. There too they pass the greater part of the day, **sleeping away the unwelcome hours of daylight,** and when dusk comes on **they creep out, with stealthy step,** and with **eyes, ears,** and **nose** on the alert, to see what they can find to eat.

2. *Refer next to what was said as to the strength and agility of these animals.*

*Tell that they are not only very strong for their size, and*

**very nimble** *in their movements, but they are also exceedingly* **bold and fearless.** They will attack animals of **twenty times their size and strength**; and they are such fierce fighters that they seem to **delight in slaughter and blood.** They are **most ferocious** and **blood-thirsty** in their nature. They are not even afraid to attack a man if they are interfered with.

THE PINE-MARTEN.

3. *Refer also to their keenness of sight, hearing, and smell. Tell that they are the most watchful of animals.* **They seem to be always on the look-out.** *Remind the children of the saying,* "**Catch a weasel asleep,**" *and show its application.*

4. *Pass on now to consider the kind of animals on which these night-prowlers prey.*

*Tell that their victims are chiefly* **rabbits** *and* **hares, rats, mice,** *and* **birds**. *The weasel and the ferret may be regarded as the farmer's friends, for* **they kill the vermin** *that feed upon his corn and crops.*

But the pole-cat, which is the fiercest and most blood-thirsty of the tribe, is a deadly enemy to **pheasants** and **partridges**, and it will sometimes also commit **terrible havoc among the poultry**, if it manages to find its way into the hen-house.

5. The pole-cat and the marten have been known to attack and kill the **young lambs in the field**, and even such large strong birds as **geese** and **turkeys**.

THE POLE-CAT.

They kill **for the mere sake of killing**—for they kill much more than they can eat.

They seem to delight in **sucking the blood of their victims**, and eating their brains.

If they attack ever so many animals in a single night, they will kill them all, suck their blood, devour their brains, and leave the rest of the body untouched.

The farmer always shoots the pole-cat wherever he meets with it. It is a terror to the farm-yard.

6. *Tell that the pole-cat, stoat, and weasel, if hurt or annoyed*

*in any way, send out from a small pouch under the tail a liquid* **with a most offensive smell.** The smell from the **stoat** and the **weasel** is **very disagreeable**, but that from the **pole-cat** is **disgusting and unbearable in the extreme.**

*N.B.—As they always send out this smell when an enemy approaches, this is thought to be Nature's way of protecting these animals from danger, for no other animals can bear the disgusting stench.*

### SUMMARY OF THE LESSON

1. The ferret, marten, weasel, pole-cat, and stoat are all wild cats.

2. These animals live wild in our woods.

3. They sleep in their holes all day, and come out to hunt their prey at night.

4. The stoat changes its colour in the winter. Its white winter coat is called ermine, a very valuable fur.

## Lesson VII

## THE FOX (A WILD DOG)

Provide for illustration Brown's picture of the fox.

### I. INTRODUCTION

1. *SHOW the picture, and commence by leading the children to tell all they can about the animal. They have heard of it as one of the wild animals of the woods; they know it, if only by repute, as* **the terror of the poultry-yard**; *they know that it is hunted, by men on horseback, with packs of dogs, called* **fox-hounds,** *which are specially bred and trained for the work. Some of them may, perhaps, have seen the fox-hounds in full cry; others may even have caught a glimpse of the flying fox itself.*

*Most of them have heard some tale of the sly, cunning nature of the fox.*

2. *Tell that, just as the weasels are a kind of wild cat, so the fox is* **a sort of wild dog.**

*Point out at the same time that, although we speak of weasels as wild cats, they are unlike the cat in several points.*

It is just the same with the fox. This animal, although a sort of wild dog, is in some points **more like a cat than a dog.** Let us see what we can learn about it.

## II. STRUCTURE

1. BODY AND LEGS.—*Turn to the picture again now, and call attention to the general appearance of the animal.*

In size and general appearance the fox is not unlike **a collie dog.** It has a **long, slender, supple body,** about two feet and a half in length (without the tail); it has a **strong, broad, and deep chest,** and **long slender legs.**

What kind of an animal would you expect the fox to be with such a chest, and such legs? A **running animal.**

Why? Because its legs are **made for speed,** and its **big chest contains big lungs,** so that it can breathe freely while running.

*Tell that the fox is not only a runner, but it can* **leap and spring** *as well, and is also* **a good swimmer.**

2. *Notice the feet next.* Like those of the cat and the dog, they are **paws,** with **five toes** on the front, and **four** on the hind ones.

*Call attention to the* **strong blunt claws.** They are like the claws of the dog. This animal **cannot draw its claws back,** and thrust them out as it pleases, and it has **no sheaths for its claws** like those of the cat.

The fox is a toe-walker, but its claws rub the ground as it walks. Hence they are blunt and not like the sharp claws of the cat. But these strong blunt claws make **splendid digging tools.** The fox uses them for digging in the ground; but they were not meant for seizing prey.

The fox, like the dog, **seizes its prey with its jaws.**

3. *Lead the children next to compare the cat and the dog as regards their covering.*

The cats are all clothed with **soft, smooth, silky fur**; dogs with **coarse hair.**

*Notice that in its covering* **the fox resembles the cat** *rather than the dog.*

Its coat is a **thick, soft, smooth fur,** which grows thicker as the winter approaches.

*Compare this with the sheep's winter fleece of wool.*

The colour of the fur is **reddish-brown,** with **white and black hairs intermingled.** But the Arctic fox (like the stoat) changes its colour to a perfect white in the winter. These foxes are hunted for the sake of their beautiful white fur coat, which is highly prized.

4. *Call attention in the next place to the long bushy tail.*

The tail is called **the brush.** It is the same colour as the rest of the fur, but **the tip** is usually **white.**

*Remind the children of the unpleasant smell of the pole-cat and some of the other members of the weasel family.*

*Tell that the fox is very much like them in this; for it carries* **a very disagreeable smell** *about with it just as they do.*

5. Near the root of the tail there is **a sort of bag,** which sends out a most **unpleasant-smelling liquid.** The fox can be smelt a long way off, and it leaves its scent behind it, wherever it goes. For hours after it has passed by any place, **the scent of the animal seems to fill the air all round.**

*Elicit that in this respect again the fox resembles the cat family more than the dog.*

The hounds chase the fox **by following the scent** which it leaves behind.

1. HEAD.—*Proceed now to examine the head. Notice first the* **long sharp-pointed nose,** *and lead the children to tell, from what they have already learned, that such a nose indicates* **a keen sense of smell.**

*Turn next to the* **short, erect, triangular-shaped ears.** *Tell that they are exceedingly* **sharp of hearing.** *Those little wide-open ears prick up at the least sound.*

*Notice also the eyes. Point out that even in the picture these eyes look bright,* **keen,** *and* **quick-sighted.**

In sight, hearing, and smell the fox is **one of the very sharpest of animals.**

2. *Tell next that the pupil of the eye contracts in bright daylight. The curtain closes round it to keep out some of the light. Compare this with the eyes of the cat and the dog.*

Why has the dog no curtain to his eye? Because he is **not a night-prowler.**

Then what kind of animal would you expect the fox to be? **A night-prowler like the cat.**

*Tell that the fox is really a night-prowler; its eyes show that it was meant for that kind of life; and then call attention to the* **long stiff bristles** *or* **whiskers** *at the sides of its face. The children of course will readily tell that these* *whiskers act as* "**feelers,**" *when it is too dark to see. The dog's whiskers are short and limp. He does not use them as "feelers," because he is not a night-prowler.*

*In this way show that in all these respects the fox is more like the cat than the dog.*

3. *Lastly, call attention to the mouth, jaws, and teeth of the animal.*

The teeth are in every respect like the teeth of the dog. There are the four long sharp-pointed teeth **for seizing the prey,** and all the rest are meant **for cutting or chopping through flesh**—not for chewing or grinding.

The mouth is exactly like the mouth of the dog, and **the jaw** (like the jaw of all the flesh-eaters) has only **the one up-and-down movement.**

## III. HABITS AND NATURE

1. *Remind the children that, as the fox is a night-prowler, it must hide away somewhere, and sleep during the day.* Like

the rest of the night-prowlers, the fox **sleeps by day,** and **hunts at night.** But where does it sleep?

*Tell that, with its strong digging paws, it makes for itself* a long **winding burrow** *in the ground, usually* **among the gnarled roots** *of some old tree.* These burrows are called "**earths.**"

2. The **curtained eyes** and the **long stiff whiskers** fit the animal for this **dark underground home.** There it lives with its mate, and rears its **family of little snub-nosed pups.**

3. The fox preys upon **hares** and **rabbits, pheasants** and **partridges** in the open fields and woods, and also steals into the poultry-yard, and carries off the farmer's **fowls, ducks,** and **geese.** When hard pressed, he will even feed upon **rats** and **mice.**

*Tell that, like all the night-prowling flesh-eaters, the fox is a* **cowardly, sly, sneaking animal; it creeps up** *to its prey with a soft,* **stealthy, cunning step,** *and when near enough pounces suddenly upon it from behind.*

*No doubt the children can tell some story of the fox and his depredations in their own neighbourhood.*

### SUMMARY OF THE LESSON

1. The fox is a sort of wild dog; but in some points it is more like the cat than the dog.
2. It has a fur coat; it has a disagreeable smell like the wild cats; it has curtained eyes and feelers; it is a night-prowler.
3. In its hunting it resembles the cat more than the dog.
4. It is sly, cunning, and treacherous.

## Lesson VIII

## THE RABBIT

Provide for illustration a tame live rabbit if possible. The keeper will no doubt be pleased to send a wild one (dead of course) for the same purpose. Have in readiness also Brown's picture of the animal, and sketches showing details of the structure. A carpenter's chisel will be required.

## I. INTRODUCTION

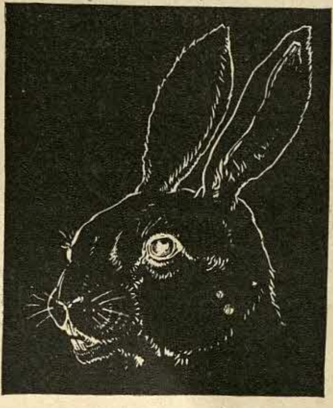
1. *SHOW the picture. The children of course recognise it at once. Let them tell that they meet with rabbits every day in their rambles through the woods and fields. Point out that those are* **wild rabbits.** *They are quite free, and run about just where they please.*

2. *Tell that people sometimes keep rabbits as pets; but they are kept in a hutch. They are* **tame rabbits.**

Rabbits are pretty little animals. Let us see what we can learn about them.

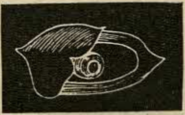
## II. GENERAL APPEARANCE

*Produce the tame live rabbit, and lead the children, step by step, to notice the chief points in the animal as follows:—*



1. SIZE, SHAPE, AND COVERING. — *Elicit that the rabbit is about* **the size of the cat**; *that it has a* **long body** *and a* **small head**; *and is covered like the cat with a* **thick, soft, warm coat of fur.**

*Lead the children to tell that the wild rabbits they see are always one colour, a sort of* **brownish-grey.** *Compare this with the colour of the tame rabbit. Tell that tame* *rabbits are of various colours—black, black and white, white, grey, and brown.*



2. EYES AND EARS.—*Call attention to the ears. They are* **long** *and* **broad,** *and will either* **stand upright** *or* **hang down. The rabbit can easily move its ears.** *Notice the* **large, bright eyes.** *They are placed one* **on each side of the face,** *not in front as ours are.*

*Point out that the eye is protected by a third eyelid, which can be drawn over it from the inner corner nearest the nose.*

*Ask the children to remember this, as it will be referred to later on.*

3. What do these eyes and ears tell us? They tell us that the rabbit is a **very timid,** gentle animal. It **cannot fight** to defend itself as dogs and cats do. It **has to be watchful** to keep out of danger.

*The children will readily tell that the big, wide-open ears catch the slightest sound; and that those eyes at the sides of the head enable the animal to see all round it at once.*

*Note that, as soon as it is out of danger,* **its long ears droop down** *on its neck; but at the least sound* **up they go again to listen.**

4. WHISKERS.—*Notice next the long, stiff hairs or bristles, which stand out on each side of the mouth.*

What other animal has whiskers like these? The cat.

What name do we give them besides whiskers? We call them **feelers.** Why? Because the animal uses them **to feel its way about when it is too dark to see.**

5. LEGS AND FEET.—*Lead the children to tell that as these animals cannot fight their enemies, they must run away and hide themselves, and this will show the need of strong legs.*

*The children themselves know that rabbits can* **run very**

**fast.** *Call attention to the* **hind-legs**—*they are much* **longer and stronger** *than the fore-legs.*

The rabbit's running is more like leaping, for **it leaps along on these strong hind-legs.** As it runs it seems to bob and jump about, **because its legs are not all the same length.**

*Picture the rabbits in the fields, darting away out of sight in leaps and bounds,* **the little white tails bobbing up and down** *as they go.*

6. Have *the feet of the animal* examined next.

The **soles** of the feet are **hairy**; this helps them in their running. Each foot has **four toes,** and the toes are armed with **thick, blunt claws.**

What use do cats and other animals make of their claws? They **fight and scratch** with them.

But rabbits are not fighting animals. What can they want with strong claws?

*Tell that these animals use their claws for digging in the ground.*

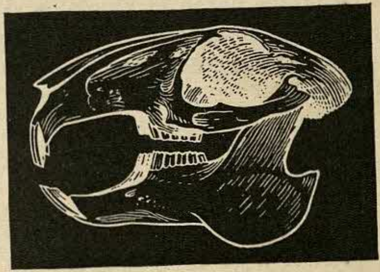
### III. Mouth, Teeth, and Food

1. Chisel-teeth in front.—We have learnt all we can of the rabbit by looking at it. Let us now examine it a little more closely. I am going to show you **its mouth and teeth,** for they will tell us what kind of food it eats, and then we shall easily learn something about its habits.

*Point out in the first place the peculiar form of the* **upper lip,** *with its* **long cleft** *dividing it into two halves,* **both movable.**

The mouth itself is small, and the teeth are different from those of most other animals. The **four front teeth,** two in the upper and two in the lower jaw, are long, broad, flat, and very sharp at their edges. **They are,** in fact, **four sharp chisels.** We often call them **chisel-teeth.**

*Point these out in a good picture of the skull, or, better still, get a wild rabbit from the keeper or the farmer for illustration.*



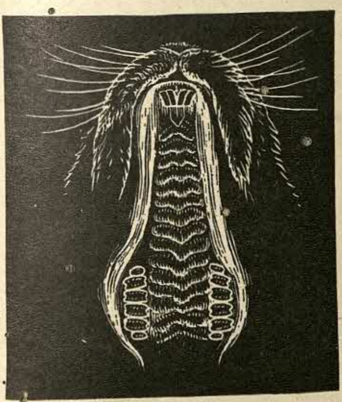
*Notice* **the groove down the middle of the two top teeth.** *It makes each tooth look like two.*

*Show a chisel, and illustrate its use. It cuts off pieces of wood in chips.*

*Tell that the rabbit uses these four front teeth* **to chip off its food in pieces.**

We say it **gnaws** or **nibbles its food,** and we call it a **gnawing animal.**

2. MOUTH MADE FOR GNAWING.—*Call attention once more to the cleft in the upper lip.*



Why should the lip be split like this? Let us see.

*Point out that we ourselves could not gnaw things as the rabbit does, although we also have four flat chisel-teeth in front.*

How is this? Our lips would be in the way; they would get cut and torn by the hard substance, and so would our mouth and tongue.

The rabbit's teeth are **made for gnawing**; they stand out well in front; and it is **to help the animal in its work** that the upper lip is split in two, so that **the two parts may be drawn back** out of the way, when it is gnawing anything very hard.

*Show too how the mouth itself is protected. Call attention to the* **white patch of thick hard skin on the tongue,** *and the* **horny ridges** *which form the* **roof of the mouth.** *Point out that even the inside of each cheek is protected by* **a tuft of hair.**

3. GRINDING TEETH BEHIND—*Have the jaws examined for the other teeth now. Notice the long space in both jaws between the chisel-teeth and the next.*

The rabbit has only two kinds of teeth. In the back part of each jaw are **the grinding teeth.** There are **six of them in the upper jaw,** and **five** in the lower. They are large square-looking teeth, with **sharp rough rasp-like ridges,** for the purpose of grinding the food which the chisel-teeth have chipped off in pieces.

The jaw moves not only up and down, but backwards and forwards, and from side to side.

4. FOOD.—Now let us notice the kind of food which these animals find to eat in the woods and fields. They eat the farmer's growing crops in the fields, and especially his **turnips** and other roots. They are also very fond of **the bark of young trees.** They gnaw off the bark as far as they can reach, **standing on their hind-legs,** and in this way do much damage.

## IV. CHISEL-TEETH ALWAYS SHARP

1. *Picture the cat, as we often see her, scratching with her claws on the wooden fences, the trees, and even the legs of the tables and chairs.*

Why does she do this?

*Explain that this is her way of keeping her claws sharp and* *in good order. Without sharp claws she would not be able to catch the mice. Tell that the* **rabbits gnaw the hard trunks of the trees** *for the very same purpose—merely* **to keep their working-tools in good order.** *Without sharp chisel-teeth to gnaw their food these animals would starve.*

2. *Show the carpenter's chisel, and lead the children to tell that, when the workman has been using it for some time,* **its edge gets blunt,** *and he has to sharpen it.*

What becomes of the chisel at last? It gets worn away with the work it does.

*Point out that, if the hard steel of the chisel wears away with its work, these* **chisel-teeth must wear away** *too in time; and then proceed to explain Nature's provision for this.*

3. The under part of the tooth is made of **much softer substance** than the front or outer part. Therefore as the teeth are used, **the softer part wears away** more quickly than the hard outer part, and so **the edge is always kept sharp.**

But even that hard steel chisel of the carpenter wears away altogether in time, and he has to get a new one.

*Explain that the rabbit never wants new teeth, because* **as fast as they are worn away at the edges, they grow at the roots,** *and are pushed up from the jaws, and so they are always kept the same length.*

## Summary of the Lesson

1. The rabbit is a timid, gentle animal, without any means of defending itself.
2. It is provided with sharp ears, and large bright eyes at the sides of its head, and it can run very fast.
3. Its hind-legs are longer and stronger than the fore-legs. They are made for leaping.
4. The rabbit is a gnawing animal. It has chisel-teeth in front, the upper lip is split, and the roof of the mouth is protected, by hard, horny skin.

5. The more the chisel-teeth are used in gnawing the sharper they get.

6. They grow at the roots as fast as they wear away at the edges.

## Lesson IX

## THE RABBIT AND HARE (COMPARED)

The teacher should be provided with Brown's picture showing the hare and the rabbit side by side, the picture showing details of structure as used in the last lesson, and another picture showing a section of the rabbits' warren.

### I. Introduction

*Introduce the new lesson by leading the children to tell all they can of the nature and general build of the rabbit. Be careful to show how the nature and habits are dependent on the structure.*

Here we have a timid frightened little animal, with no means of defending itself against its numerous enemies. To make up for this it has a **pair of large wide-open ears,** and its **eyes** are placed **at the sides of the face.** It can easily erect its ears, and turn them in any direction to catch the faintest sound, and the eyes can see readily on all sides.

In this way it gets timely warning of all danger, and then it is able to make use of its swiftness in **running** or rather **leaping away.**

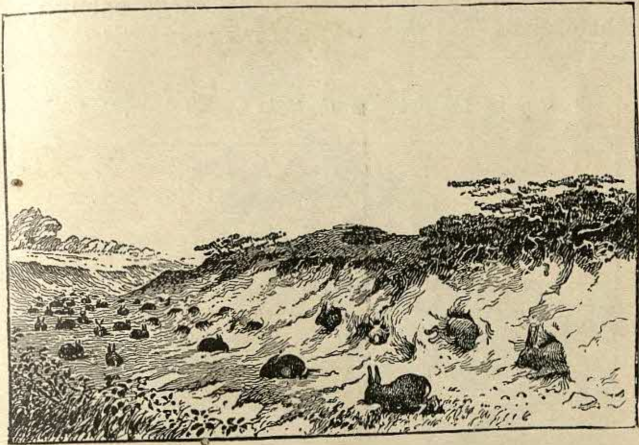
It was intended to live on roots and other vegetable food, and it is provided with **chisel-teeth** for nibbling or **cutting away its food in chips,** fit for the grinding teeth to chew.

*Lead them next to talk about the* **thick warm covering of fur.** *Show that this is just the sort of coat to fit the animal* **to live in the open air.** *The* **colour of the fur** *too is* *just the* **colour of the ploughed fields,** *over which it loves to scamper.*

*The paws are made for* **scratching** *and* **digging** *in the earth, and the* **whiskers** *are for the purpose of* **feeling its way** *in the dark when the eyes are no longer of use. All this should be carefully elicited step by step.*

## II. Rabbits at Home

1. Tell that in all parts of the country rabbits live wild in the fields and woods just as we see them here. They are very frightened timid creatures, and like to hide away out of sight in their homes.



But their home; what is it? Rabbits make their homes **underground.**

How do they do this? They use their **strong feet** and **stout blunt claws to burrow** or **dig holes in the ground.**

2. *Refer at this point to the rabbit's eyes. Lead the children*

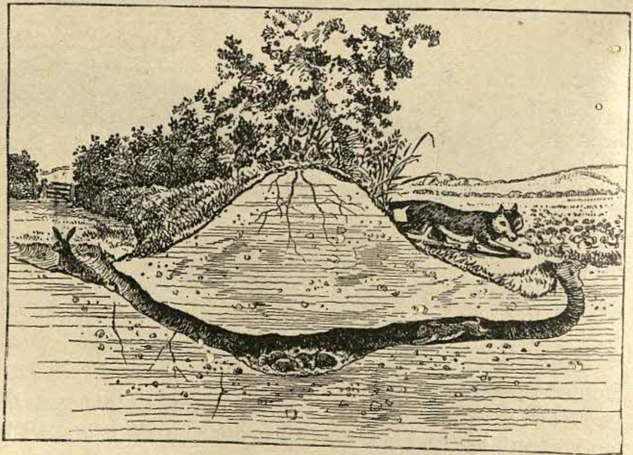
*to call to mind the peculiarity of* **the third eyelid.** *Explain that this is Nature's way of protecting the eyes of this burrowing animal from injury.*

3. They always choose a sandy spot, often on the sunny side of a hill, where it is sure to be warm and dry, and here they set to work. They dig easily in the sandy soil with their feet, and make **long winding passages** or **burrows** under the ground.

They live together in great numbers,,and make their burrows **side by side.** A **great many burrows** close together form **a warren.**

*Tell that, once in their burrows, the* **rabbits are safe** *from all such large enemies as* **dogs** *and* **foxes,** *because they make their long winding holes only* **just large enough for themselves,** *and those big animals cannot make their way into them.*

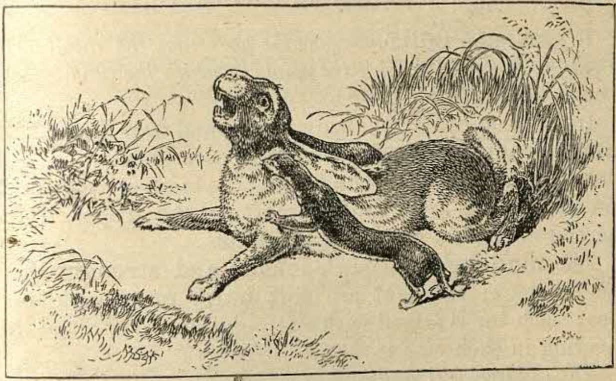
4. *Remind the children that the rabbit has other enemies* **quite as terrible,** *although smaller even than they themselves are. Show pictures of the* **ferret** *and* **weasel.**



These fierce little animals can easily make their way into the burrows. How do the rabbits protect themselves against them?

*Tell that they always make their burrows* **with two or more entrances,** *so that if any such enemy should come in at one hole, they would be able to* **escape by another.** *Remember they cannot fight.*

5. Let us have a peep at the rabbit at home. Here, at the end of one of those long passages, the mother rabbit prepares a nice **snug bed** of grass, hay, or straw, and to make it still warmer and more cosy she covers this **with fur from her own body**. This is where the tiny rabbits are born and kept safe.



But remember, it is quite **dark in those underground passages**. How do the rabbits get on in the dark? Their **feelers serve them instead of eyes,** so that they know where they are going.

6. *Elicit from the children that rabbits are rarely seen abroad during the day, certainly never far from their burrows; but* **towards dusk,** *and* **in the early morning,** *they love to*

*scamper over the fields. The* **colour of their fur,** *which is very like the colour of the earth,* **serves to hide them from their enemies,** *and their sharp ears and eyes tell them if any danger approaches.*

*Picture them scampering off into the corn-fields and turnip-fields.*

Why do they go there? **To get their food.** They do much damage by gnawing the farmer's crops, and the farmer often takes his gun in the morning and evening, and makes short work of the intruders.

## III. HARES AND RABBITS

1. GENERAL BUILD.—*Show the hare and the rabbit side by side, and proceed to elicit the points in which the two animals resemble each other.*

In both animals the body, head, and ears **have the same general shape**; the **eyes** are large, and are **placed at the sides of the head**; the teeth are the same, and there is the same split or **cleft in the upper lip**—therefore both are **gnawing animals.**

The **hind-legs** are much **longer and stronger** than the fore-legs; the **feet** are **soft hairy paws** with four toes; each toe is armed with a strong blunt claw; and the covering in each case is a coat of **fur.**

*The children will readily note such points as these.*

We find then that the two animals are alike in shape and general appearance. But I want you to look again, and tell me whether they are alike in their nature.

Can you tell this too by looking at them? Yes; they are **both timid animals,** and unable to fight to defend themselves.

How did you find that out? Their **ears** and **eyes tell us that.**

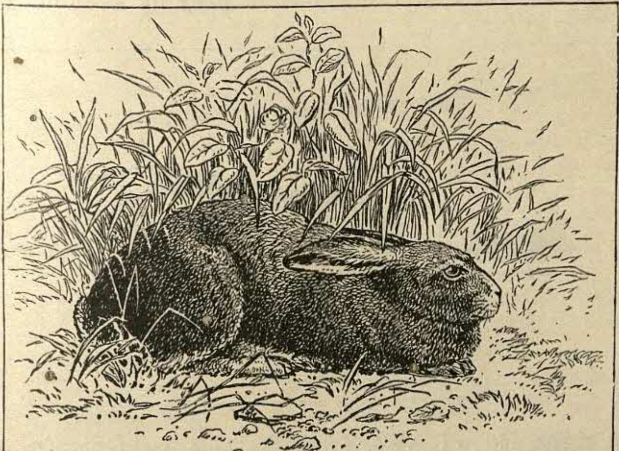
Why should timid animals have ears and eyes like these? They have to be **very watchful—always on the look-out for danger.**

*Picture hares and rabbits in the fields in the act of listening. They can turn their ears backwards or forwards, or from side to side, to catch the sound from any direction. The* **hare** *is* **even more watchful** *and alert than the rabbit. It is a very difficult matter to get near a hare.*

*Lead the children to deduce from this the necessity for* **the long hind-legs**, *which are so much longer and stronger in the hare than in the rabbit. All timid defenceless animals are very swift of foot;* **the hare is one of the swiftest of animals.**

2. THE FUR COAT.—The **fur of the hare** is **soft** and **curly**, almost like wool; the **rabbit's fur** is **smooth,** and not in the least curly. The colour too is different. The back and sides of the hare are **reddish-brown mingled with black,** the **under part** of the body is **almost white.** The rabbit's fur is a greyish-brown colour.

3. HABITS.—*Remind the children of the gregarious nature of the rabbit. not of course using the word gregarious itself, but*



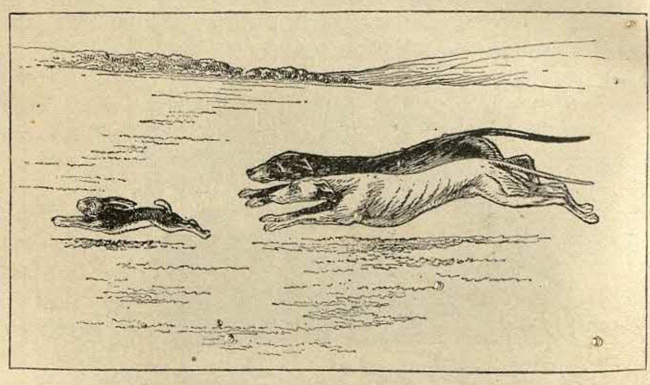
*leading them to describe its* **burrowing habits,** *and its life underground*—**immense numbers living together in one warren.**

*Tell that* **the hare is not fond of company,** *and is* **not a burrowing animal.** *It* **does not live underground.** *It chooses a quiet spot, where the grass and ferns are thickest, and there it makes a slight hollow*—**a sort of nest**—*just big enough for itself and its mate. This is its home, and this is where its little ones are born—three, four, or five in a litter.*

We call this nest **the form,** because **it takes the shape or form** of the animal itself.

*Remind the children that the hare is much worse off than the rabbit, for it has no underground burrow into which it can rush for safety from its enemies; and so lead them to see* **the need for greater speed in running.**

The hare is hunted by very swift dogs called **greyhounds.** These dogs **chase their prey by keeping it in sight,** and at last run it down exhausted. It is really a race between the hare and the hounds; but **the hare is running for its life.** We call this sort of hunting **hare-coursing.** *Many of the children will be quite familiar with this.*



*Describe the hare's clever trick of dodging the dogs* **by doubling on them.** *In its headlong speed it manages* **to turn all of a sudden,** *and run off in another direction. The dogs cannot do this so well, and they dash ahead in the same course for some time before they can turn. This gives the poor hare a fresh start, and often saves its life.*

### SUMMARY OF THE LESSON

1. Rabbits use their strong blunt claws for burrowing in the earth.

2. They live in burrows to be safe from their enemies. They come out to feed.

3. Hares do not live together in great numbers, and do not burrow.

4. They make a nest or "form" among the grass and ferns.

5. The hare is larger than the rabbit. It is one of the swiftest of animals.

6. Hares are hunted with very swift dogs called greyhounds.

## Lesson X

## RATS AND MICE

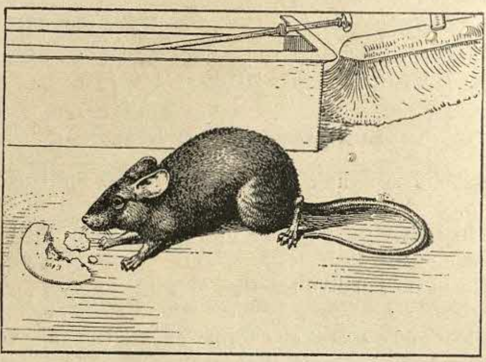
Provide for illustration a live mouse in a cage, a dead rat, and Brown's pictures of the field-mouse, harvest-mouse, and water-vole.

### I. INTRODUCTION

1. *PRODUCE the live mouse in the cage, and its two smaller cousins —the field-vole and the harvest-mouse; and proceed to elicit all that the children can tell about them.*

*They are familiar, of course, with the common house-mouse. They probably know that these little animals, as well as the smaller* **field-mice,** *or* **field-voles** *as they are sometimes called, infest the farm-yard, and take up their abode in the barn and ricks, where they do an immense amount of damage by eating the farmer's corn.*

2. *Compare these with the pretty little* **harvest-mouse.** This is a tiny thing not more than four and a half inches long from the nose to the tip of the tail. The head and body together measure a little over two inches, for more than half its length is taken up by the tail. It is **the smallest of all four-footed animals.**



THE COMMON HOUSE-MOUSE.

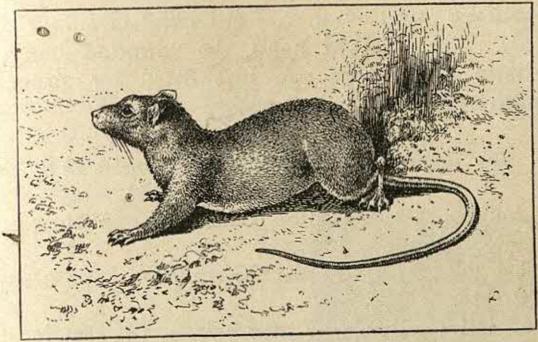
*Describe the beautiful nests these little creatures make of grass and leaves among the stalks of the growing corn. It would be well to get one for the school museum if possible.*

3. *Now show the* **common brown rat,** *or failing the dead specimen, a good picture of one, and compare it with the mouse. Lead the children to tell that in general appearance the two animals are very much alike, but the rat is much larger and stronger than the mouse.*

Rats, as well as mice, infest the farm-yard, and rob the farmer of his stored-up crops.

4. *Show the picture of the* **water-rat,** *or* **water-vole** *as it is called. Tell that this is a sort of cousin of the common rat, and that it always lives* **on the banks of ponds and streams.** *Some of the children have no doubt seen it* **swim-**

**ming** *in the water. Tell that it is a* **pretty, harmless animal,** *not at all like the ferocious brown rat.*



THE BROWN RAT.

WATER-RATS.

These animals all belong to one family. Let us examine them a little closer.

## II. General Appearance

1. Shape and Covering.—*Call attention to the shape of the body.* The **pointed head,** the **rounded body,** and the **little short legs** are just fitted for **squeezing through small holes.**

2. *Note that all these animals are covered with soft warm fur.*

When do rats and mice come out from their holes? At night, when all is quiet.

What do they do in the day-time? They **sleep in their nests.**

Now tell me then why they have a fur coat for their covering? They are **night-prowlers; they want a good coat** to keep them warm at night.

3. *Compare the colour of the fur in the different animals.*

The **common rat** and the **house-mouse** are a **greyish brown colour.** The **water-rat** and the **field-vole** are a **ruddy brown** on the upper parts, and **grey on the under part** of the body. The pretty little **harvest-mouse** has a **delicate reddish brown coat,** with **the under parts white.**

Eyes and Ears.—*Notice that the* **eyes** *are* **very bright and sharp.** *They look like little black beads. The* **ears** *too are* **large and rounded**—*something like an open shell in shape.*

These night-prowling animals are **surrounded with enemies** on every side. They must be **always on the watch.** They want the sharpest of eyes and ears. Their eyes are fitted for seeing in the dark.[1]

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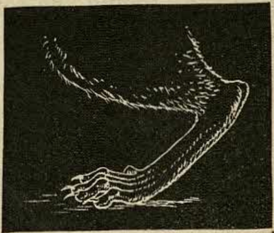
[1] *N.B.*—The water-vole is not a night-prowling animal. It may often be seen in and near the streams during a ramble in the day-time.

WHISKERS.—How do night-prowling animals find their way about, when it is really too dark for even their sharp eyes to see? They use their **whiskers** as "**feelers.**"

*Notice that all these animals have long stiff feelers on both sides of the face.*

1. LEGS AND FEET.—*Compare these parts by means of the dead specimens or the picture.*



The **feet** of all these animals are **paws,** with **five toes on each paw**; but the inner toe on the front paw is very short. The toes are armed with **very sharp claws.**

*Compare with the sharp claws of the cat. Remind the children of the cat's climbing powers. Tell that these sharp claws make rats and mice* **excellent climbers.** *Like the cat, they can climb trees, or walls, or anything with a rough surface.*

2. *Call attention in the next place to the peculiar way in which the hind paws of the rat are jointed to the legs.* The rat is able to **turn its loosely-jointed hind paws outwards,** when it wants to take a firm grip of anything.

*Explain that this is another great help to the animal in its climbing, particularly in running head-first down a wall or a tree.*

3. *Notice the water-vole in the picture.* The soles of **its feet are naked.** *Show the hairy feet of the common rat and the mouse, and tell that* most of the family have feet with **hairy soles** to help them in running. *Compare with the rabbit and the hare.*

*Point out that the water-rat depends for its safety more upon swimming than running.* These naked feet are better **fitted for swimming** than hairy ones would be.

1. TAIL.—*Call attention to the tails of the common rat, the house-mouse, and the little harvest-mouse.*

All three have **very long tails**—that of the harvest-mouse is as long as all the rest of its body.

2. *Remind the children that all these animals must be good climbers.* They use their tails **to help them in climbing.**

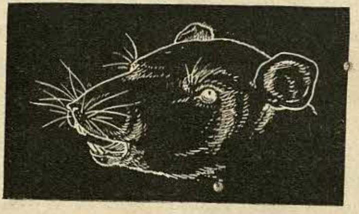
*Picture the little harvest-mouse in its home among the growing corn.* In clambering to and from its nest, which is always raised about a foot above the ground, it **twines its long tail round the corn stalks,** and this makes it very nimble.

3. *Turn next to the tail of the water-rat. Notice that this* **tail is very short** compared with those of the other animals. It is also **thicker** and **more hairy.**

*Remind the children that the water-rat is a swimmer, not a climber.* It uses that **short thick tail** as **a rudder to steer itself** through the water.

## III. MOUTH, TEETH, AND FOOD

1. CHISEL-TEETH IN FRONT.—*Call attention to the teeth next. Notice the* **four long broad flat chisel-teeth** *in front — two in each jaw. Let the children observe for themselves that all the animals have these same chisel-teeth in front, and then compare them with the* **front teeth of the rabbit.**



2. *Proceed to notice point by point.* The rabbit is a **gnawing animal,** and to assist in the work of gnawing, **the upper lip is split.**

*Show the split upper lip in these animals, and then notice that* **the lower jaw is shorter than the upper.**

**Rats and mice**, like rabbits, are **gnawing animals.** The mouth as well as the teeth is made for gnawing.

3. *Lead the children next to tell how the rabbit's chisel-teeth* **grow from below,** *as they wear away at the edges; and why it is that the more they gnaw,* **the sharper they keep the edges** *of these chisels.*

The chisel-teeth of rats and mice are in every respect like those of the rabbit.

*Notice in passing that the chisel-teeth of the water-rat are yellow, and thicker and stronger than those of the common rat.*

4. *Proceed lastly to notice the* **grinding teeth** *in the back of each jaw, and the* **wide space between them and the front chisel-teeth.**

Rats and mice, like rabbits, have **no tearing teeth.** They were not meant to be flesh-eaters. Their grinding teeth are intended for **chewing the food** which is gnawed off by the front chisels.

*Tell that although rats and mice are gnawing animals, they are not at all particular as to their food. They seem to devour anything and everything that comes in their way.*

## SUMMARY OF THE LESSON

1. Rats and mice are night-prowlers; they have sharp eyes and ears, and long stiff feelers.
2. The water-rat is not a night-prowler.
3. Rats and mice are excellent climbers. Their feet and tail are made for climbing.
4. The water-rat is intended for swimming rather than climbing. Its feet are naked, and its tail is shorter than that of the common rat. It uses its tail as a rudder.
5. Rats and mice are gnawing animals.

## Lesson XI

## WINTER (A RAMBLE)

Brown's picture of Winter will be required for recapitulation in the school-room.

1. *In preparation for this the teacher should take the opportunity, in some reading or conversation lesson during the week, to introduce and explain the term* "**Nature.**"

In speaking of Nature we mean **everything around us not made by man.** The earth and water everywhere, and the air and sky above, together with every kind of living thing (animal and plant), are all included under the one name "**Nature.**"

*Choose a typical winter's day during a spell of hard frost for the ramble, so that the children may have around them on every side all the phenomena which are to be dealt with.*

*Take a common thistle-spitter instead of a walking-stick, and let the children double off at a gentle trot along the road. As soon as the run has set their blood into healthy circulation gather them together, and walk along at a more leisurely pace, calling attention to the landscape on the way.*

*Tell them that the object of the ramble is to* **observe Nature in her winter dress.** *The teacher of course will guide the class in the order of the observations they make.*

### I. The Repose of Nature

1. The **hedges** and **trees** are **bare** and **leafless** ; the **frost sparkles and shines** on the branches and twigs ; and the **fields are dazzling** in their white covering of snow.

There is either **no sun at all to be seen,** or else it appears **like a dull red ball of fire, low down in the sky,** behind dark leaden-grey clouds.

2. The **ponds** and **ditches** everywhere are **frozen over**; **every puddle** in the roadway is **solid ice**; even the mill-stream itself has ceased to flow, and the great wheel stands idle, with the **icicles hanging from it.** It is a beautiful cold picture; but it is **a picture of death** rather than life.

3. *Stand and listen.* **How still everything is.** There is nothing stirring—no sound, except now and then we hear the bark of a dog at the farm yonder, or perhaps the shrill note of the missel-thrush in the wood.

What has become of the song-birds?

There are **very few birds to be seen,** and we miss the buzzing sound of insects on the wing, for **not a single butterfly, bee, or insect** of any kind could live in this cold biting air. Surely, everything round us must be dead.

4. *Compare all this with the picture of a tired man sleeping peacefully beneath the white coverlet of his bed. Still as he lies he is not dead. He is resting after his labour; by and by he will rise from his sleep refreshed, and ready for another day's work.*

When do we go to bed to sleep? At night.

**Winter** then is **Nature's night.** Nature, as we look upon her now, is not dead. **She is asleep—taking her repose**—and so gaining fresh strength for the work of the coming year.

## II. Jack Frost's Iron Grip

1. *Take the children into a ploughed field, and let them stand on the ridges, which peep up through the snow that fills the furrows. They observe that the* **ground** *they stand on is* **almost as hard as the road itself.** *Take up a lump of*

*it with the help of the spitter. It is hard work to dig it up. Notice that it is not at all like the loose crumbly soil which we find at other times.* **It is frozen hard.**

2. *Refer to the lesson in last year's course, and lead them to tell that the soil is porous; that the* **pores are full of water**; *and that this water has* **frozen in the pores.** *Remind them of the experiment of freezing water in the bottle.*

What happened? When the water froze into ice **it burst the bottle.**

*Tell that, in the same way, the water freezes in the pores of the earth and* **breaks up the clods,** *and when the ice melts,* **those lumps of earth will crumble into fine soft soil,** *ready to receive the seed.*

Here then **Nature is preparing** for the coming year.

3. *Remove the snow from one of the furrows, take up a lump of the underlying soil, and compare it with the first lump taken up.* **It is not so hard.**

N.B.—*The teacher may find it necessary, if the frosts have been very severe, to go deeper into the soil, in order to show that the frost penetrates deeper where no snow lies than it does directly under the snow. If so remove the top soil carefully with the spitter.*

The covering of snow acts as a protection to the earth. It really **keeps the earth warm,** for it prevents the frost from getting to it.

## III. NATURE'S CARE FOR ALL

1. *Call upon the children to observe that in digging up the ground we have not met with* **a single worm, beetle,** *or* **any sort of living thing,** *such as we should be sure to have found at any other time.*

What has become of them? Are they all dead?

2. *Explain that:—*

(*a*) **Worms make their way downwards,** as winter comes on, and bury themselves deeper in the ground, **to get out of the way of the frost.** They will come up to the surface again when the frosts are all gone.

(*b*) **Slugs and snails** also hide and **bury themselves** as far as they can in the ground, and then winter's **warm snow blanket covers them up,** and protects them from the frost.

(*c*) **Beetles and other insects** lay their eggs in the ground during the summer and autumn; but the frosts of winter would kill the grubs which come from the eggs, except for Nature's warm covering of snow.

**Nature takes care of all her creatures** — the smallest and meanest are not overlooked.

3. *Lead the children in the next place to think of the* **acorns** *and* **seeds of all kinds** *that fall from the trees and other plants in the autumn. The winter frost would kill them as they lie on the ground, but* **Nature covers them over with her warm blanket of snow,** *and protects them from the frost.*

The snow acts as a protection for all seeds that are in the ground.

4. *Let this naturally lead the children to notice the frozen streams and ponds.*

Jack Frost has been at work here. The water is all covered with ice. **Fishes cannot live in ice.** Frost would kill them as well as other creatures.

What becomes of the fishes?

*Tell that just as Nature provides a covering of snow to keep the earth warm by shutting out the frost from it, so also* **she provides a covering of ice for the water.** When the pond freezes, **the ice forms on the surface only.** The water below does not freeze. **The sheet of ice,** which covers the pond or stream, **shuts out the frost** from the water below, and so **prevents it from getting too cold.**

The fishes live in it all through the winter, and take no hurt, because **Nature's covering of ice protects the water itself from the frost.**

5. *Turn next to the meadow-lands. If the snow is not too deep, walk across one of the fields, and call attention to the same iron-bound condition of the ground.*

**The patches of grass** that show here and there through the snow are **frozen hard and crisp** under the feet. Sheep and cattle would not find much to eat here. Yet there are sheep in this field.

6. *Notice how* **they huddle together for shelter** *under the north or east hedge.*

Why is this? Because what little sun there is shines there. It is **the loo side** of the field. They are seeking what protection they can get from the cold biting north and east winds.

Where are the cattle? They are in the **fold-yards** or **cow-houses** at the farm.

Why are they kept there now? **For warmth and shelter,** and because it is easier to feed them than it would be in the open fields.

Why not put the sheep in houses? Because **Nature protects them from the cold** by providing them with a **thick fleece of wool.** They do not feel the cold through that thick coat.

7. *Notice, however, that the sheep must be fed, for they cannot find enough food for themselves in this frozen, dead-looking meadow.*

*Call attention to the* **hay-racks** *and* **feeding-troughs,** *and elicit that the farmer's men feed the sheep with* **hay, corn,** *and* **cut swedes** *during the winter.*

8. *If time permit, trot the children off now to the* **coppice** *or* **wood.** *Observe that here too we find the same* **death-like stillness.**

**The wood,** which is at other times full of life, **is now**

**asleep,** and like everything else **in the iron grip of Jack Frost.**

There are **no squirrels** now to be seen frisking about among the trees, and only **a few chirping, twittering birds,** instead of the hosts of songsters, which at other times fill the air all round with their merry music.

9. How do the few birds we see here manage to get their living in this frost-bound winter-time?

*Call attention to the* **"hips and haws"** *and other* **autumn fruits** *which are still to be seen on the branches and twigs. These will answer the question.*

**Nature provides for the birds.** The very colour of these late-hanging fruits—bright red—is Nature's provision. **The bright red colour shows up** distinctly against the white snow all round, so that the starving birds may not miss them.

### IV. MAN HELPS NATURE

1. We see that under this iron grip of the winter frost **the ground cannot be worked.** It is too hard.

Is the farmer idle then during the winter? No; this is his time **for hauling manure on the land.**

*Hauling may be actually going on in the fields and meadows at the time. If so, call attention to the* **big wheels** *of the* **putt,** or manure cart, *and the* **heavy loads of manure** *and* **compost** (*farm rubbish mixed with lime*) *that are being carted on to the land. In this way lead the class to tell why* **winter is a suitable time for carting manure on the land.** The ground is frozen hard and no harm can be done. It is also easier for the horses.

2. But what is the farmer really doing in all this? He is preparing for the time to come. **He and Nature prepare at the same time.**

When the crops in the fields and the grass in the meadows begin to grow, **they will require plenty of food from the soil.** The farmer is helping Nature now by **putting this food on the land.**

3. *Another, and no less important work, that of* **griping** *or* **drain-cutting,** *may have been going on in one of the meadows, until the frost put a stop to it.*

*Let the children examine the* **gripes** *or* **drains.** *Compare them with the furrows in the ploughed field. Notice* **how straight** *they are, and that* **each gripe slopes gradually into another,** *which runs into a* **ditch** *or* **rhyne.**

*The class will readily describe all this. Lead them to tell that this is a preparation against future rains.* **The farmer is again helping Nature.**

### Summary of the Lesson

1. Winter is Nature's resting time.
2. The ground is frozen hard. The snow acts as a warm blanket to keep out the frost.
3. Worms and other creatures bury themselves deep in the earth.
4. The sheet of ice on the pond shuts out the frost from the water below.
5. The birds in the woods live on the autumn fruits and berries.
6. The farmer manures the land while it is resting.

## Lesson XII

## SOME WINTER SLEEPERS

The teacher should be provided with Brown's pictures of the squirrel, dormouse, harvest-mouse, and common bat. If a pet squirrel and a dormouse could be obtained, it would of course make the lesson much more attractive and real.

## I. INTRODUCTION

1. *Commence by referring briefly to the preceding lesson. Picture the woods and fields as they appear in winter. The trees and bushes are bare, all the other plants have died down to the ground, and the ground itself is covered with frost and snow.*

*There is* **nothing growing**—*there is* **not a particle of food for any living creature** *anywhere, except a few berries and other fruits here and there for the birds.*

2. All through the winter we miss one merry playful little creature of the woods, which at other times is to be seen frisking about among the branches of the trees.

Can you tell me its name? The **squirrel.**

Would you like to know what becomes of it all through the winter? I will show you how **Nature takes care of it**, and other little animals like it.

3. You know that when night comes we go to bed and sleep till morning without troubling to eat or drink. **We do not require food when we are asleep.**

Even poor starving people sometimes try to sleep, **in order that they may forget their hunger.** They do not know they are hungry while they are sleeping.

**Winter,** you remember, is **Nature's night.** The little squirrel knows there is nothing for it to eat, so what do you think it does? It simply goes to sleep, and **sleeps all through Nature's long night.** It does not leave its warm nest till the frost and snow are all gone.

*Tell that there are other winter sleepers besides the squirrel, and that to-day we are going to see what we can learn about some of them.*

## II. THE SQUIRREL

*Show the picture of the animal, or better still the animal itself if possible. It is more than likely that the children them-*

*selves may be able to bring one for the lesson, as the squirrel is a favourite domestic pet with most children in nearly all parts of the country.*

*Lead the class to describe it as follows :—*

1. STRUCTURE.—It is a small animal, measuring **about fifteen inches** from the nose to the tip of the tail. But the **large bushy tail** itself is from **seven to eight inches in length.**

*Call special attention to this. Tell that this thick bushy tail is* **the squirrel's winter blanket.** Covered with its warm thick coat of fur, and wrapped up in its winter blanket, the squirrel sleeps as cosily all through the winter as we do in our warm beds at night.

2. *Compare this great bushy tail with* **the little short tails of hares and rabbits,** *and the* **long bare thin tails** *of rats and mice.*

All these animals are **very timid**; they have many enemies who can easily get at them in their holes. They must be **always on the alert**; they are all **light sleepers**; they have very **sharp eyes and ears.** It would never do for them to cover up their head and ears when they go to sleep, as the squirrel does.

3. *Deduce from this that the squirrel in its nest* **must feel itself very safe from its enemies,** *for it goes off into its deep sleep without any fear of danger.*

4. *Notice the ears next, comparing them with those of the hare and the rabbit.*

The squirrel's ears are **small** by the side of them. This little animal was meant to live in a home, where it would **not be in constant dread of its enemies,** as the hare and the rabbit are.

*Tell that in summer the edges of the ears are smooth, but* **in winter a thick fringe of hairs grows on them,** *and this makes them look much larger than they are.*

5. *Pass on to examine the teeth next. One glance at the chisel-teeth in front of both jaws will be quite sufficient. The children will of course readily tell that* **the squirrel is a gnawing animal** *like the rabbit, hare, rat, and mouse.*

6. *Lastly, notice the feet.* They are **paws**; but they are **more like the paws of the rat** than those of the rabbit, for **the toes are long and thin,** and **the claws** on them are **better fitted for climbing** than for digging.

1. HABITS.—*Proceed now to deduce from what has been said that the squirrel was* **meant for a climbing life,** *and that this is the reason why* **we always find the little animal in the trees.**

It makes its home in the trees, and there it feels quite safe, for very few of its enemies are so nimble among the tree-tops. It will **run along the branches** with amazing speed, and **jump from branch to branch,** and **from tree**

**to tree** as few other animals can. It is **seldom seen on the ground**.

2. *This will naturally lead the children to wonder what it feeds on and where it finds its food. Tell that its food consists of* **fruits, nuts, acorns,** *and* **beech-mast**—*all of which it can* **find on the trees** *without coming to the ground.*

*Give the squirrel a nut, and watch how it eats, sitting up on its haunches, and holding the nut in its fore-paws.*

3. *Tell that all through the autumn* **it feasts away greedily** *on the abundance of food which it finds, so that, when its winter sleeping-time comes,* **it is very fat.** *It lives on its fat during the long winter, and so takes no harm.*

*Tell too that during the autumn* **it lays up a store of food** *close by its nest, so that if it should wake up hungry in the winter,* **it may easily eat what it wants** *and go off to sleep again.*

4. This leads us to think next about the **squirrel's nest.** It has two homes—**one for the summer** and **one for the winter.**

The summer home is always perched high **among the topmost branches** of the tree, where no enemy can reach it. None but small light animals like itself could be borne on those slender branches.

It is a **cosy nest made of grass, leaves, hay, and moss,** and in it the young ones are reared in perfect safety. It is always well hidden among the foliage of the trees.

The **winter** or **sleeping nest** is generally **in a hollow tree,** or else **in a fork between two of the lower boughs**—always cleverly hidden from sight, although of course the trees are all bare and leafless.

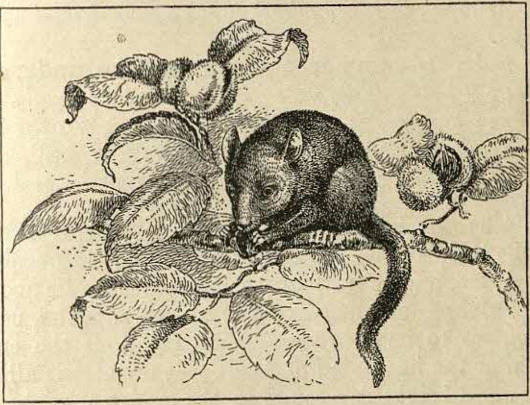
### III. The Dormouse

*Show the picture of the dormouse, or as before a pet animal if possible. Tell its name, and explain that this is* **another**

**of the winter sleepers.** *Its name* **dormouse** *means* **sleepy mouse.**

*Proceed to describe it briefly, comparing it with the squirrel:—*

1. STRUCTURE.—It is a little animal **about the size of the common mouse**; but it has a **thick tail**, which, although not so bushy as the tail of the squirrel, is nearly as long as all the rest of its body. **Another sleeping blanket.**



*Notice its* **large full eyes** *that look like* **big black beads,** *its big* **wide open ears,** *and its* **chisel-teeth.**

*Tell that the dormouse is a night animal.* **It sleeps all day** *and* **comes out at night to feed.**

2. *Lead the children to tell that, as it is* **small, weak, timid,** *and* **unable to fight,** *it is sure to have* **many enemies** *among the night-prowling flesh-eaters. Hence those* **sharp bright eyes** *and* **large wide-open ears,** *for it must always be on the alert.*

3. *Its teeth tell us that it is a* **gnawing animal.** It lives on the same kind of food as the squirrel.

*Call attention to the legs and feet next.* The fore-limbs are shorter than the hind ones, and **the feet** are **paws for climbing and grasping** like those of the squirrel.

4. Habits.—Its home is **in the trees.** It is usually met with **in the densest thickets** and **coppices**, or in **the hedgerows.** It uses its feet like hands, and is extremely nimble **in climbing from branch to branch.**

5. *Tell that, like the squirrel, it has a summer and a winter dwelling.*

*It makes its* **summer nest among the underwood,** *and there it lives with its mate and rears its little family. But as autumn advances it sets about building its* **winter nest,** *which is a neatly-constructed* **sort of hollow ball,** *and is always placed in the most hidden part of some thick bush.*

6. The nest is finished **about the middle of October,** and the little animal, which has been feasting greedily for a long time, and **is now quite fat,** takes up its abode in it, and **sleeps for the next five or six months,** usually waking up to its everyday life again about the end of March, or the beginning of April, when winter is all over.

A warm bright day comes in the midst of winter, and it is enough to rouse the little sleeper. **It wakes up,** turns over, **eats what it wants** from its food store, and at once goes off to sleep again.

## IV. The Harvest-Mouse

1. *Show the picture of the harvest-mouse, and its nest among the stalks of the growing corn.*

*Tell that this tiny thing is another of the winter sleepers.*

*Explain that like the others it has a summer and a winter dwelling.*

This **pretty nest among the corn-stalks is its summer home,** and here it lives with its mate and rears its little family. *Notice how well its paws are fitted for climbing up the corn-stalks.*

2. *Remind the children that at harvest-time the corn in the fields is all cut down and carried away.*

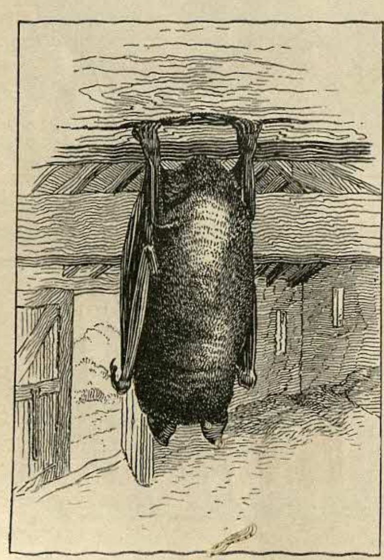
What becomes of the little harvest-mouse when it is turned out of its home?

*This of course will set the children thinking. Picture the tiny creatures. They are easily able to hide among the corn, which is* **nearly the same colour as their fur coats.**

*Tell that sometimes they hide themselves among the cut sheaves, and get carried away with them, and so they find* a **new home in the corn-stack** *in the farmer's rick-yard.*

3. Those that are not carried off in this way **dig burrows for themselves in the ground,** and make these burrows their winter home. Here they roll themselves up in a ball, and **sleep away the time,** without troubling about food.

When the frost and snow are all gone, **they wake up,** come out of their winter quarters, and **look about for something to eat.** By this time the green corn is about a foot high. They clamber up the stalks, and set to work to **build themselves a new summer palace.**



## V. The Bat

1. *It would be well to glance at this animal in passing. The children are all familiar with it. They know that although it is something like a mouse in shape,* **it has wings,** *and flies through the air.*

*Tell briefly why it flies.* **It lives on insects,** and it **catches the insects on the wing.**

2. Why do the squirrel, the dormouse, and the harvest-mouse sleep through the winter? Because **there is no food for them** anywhere. They do not need food when they are asleep.

3. **Bats are winter sleepers too.** They choose some dark out-of-the-way place, where they are sure not to be disturbed, and **there they settle down to sleep,** hanging either by their feet or by a sort of hook on the wing.

Why should they sleep through the winter? **Because all the insects are gone. There is nothing for them to eat.**

### Summary of the Lesson

1. Some animals sleep through the winter, because there is no food for them to eat.

2. The squirrel, dormouse, harvest-mouse, and bat are winter sleepers.

3. The squirrel, dormouse, and harvest-mouse are gnawing animals.

4. They have two homes—one for the summer and one for the winter.

5. The bat feeds on insects, which it catches on the wing. There are no insects in the winter.

6. It sleeps through the winter hanging by its feet, or by a sort of hook on the wing.

## Lesson XIII

## THE HEDGEHOG

Provide for illustration a tame hedgehog, if possible, and Brown's picture showing details of the animal.

### I. Sharp Spines for Covering

1. *Introduce the tame hedgehog. Let the children give the name of the animal, and tell all they can about it. Most of*

*them are no doubt more or less familiar with it, for the hedgehog is met with in all parts of the country.*

*The first thing of course to attract attention will be* **its peculiar covering,** *so unlike the coat of any other animal they have seen. Let them examine the spines closely.*

They are about **an inch in length**; they end in a **sharp point**; and the pointed ends are **all directed towards the tail** of the animal.

2. *Tell that if the skin is stripped off from a dead hedgehog, the spines are found to be* **something like a large pin, bent near the head. The root of the spine,** *which answers to the head of the pin, is* **fixed under the skin** *in such a way that the spine itself is* **free to move in any direction.**

*Sketch this on the black-board, and illustrate further by means of a large bent pin stuck through a piece of wash-leather.*

3. *Point out that with this arrangement, although the spines now lie nearly horizontal upon the back of the animal, it can in a moment raise them all, so that* **their sharp points stand up perpendicularly all over the body.**

*While telling this contrive to tilt the table, and at the same time give the hedgehog a push to make it tumble down on the floor.*

As it falls it will **roll itself up into a ball,** with its sharp spines bristling out in all directions.

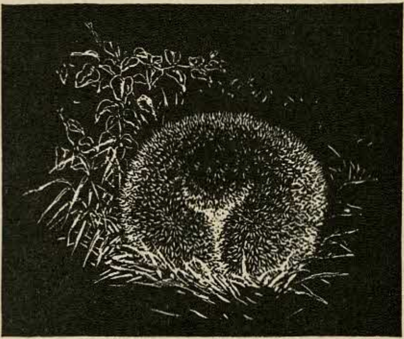
4. How strange this is. What can be the meaning of it all? Let us see.

*Point out that the hedgehog is only a* **small weak animal,** *and that like all small weak animals,* **it has many enemies** *among the fierce flesh-eaters. It has neither strength nor courage to fight these enemies.* **It is not a fighter.** *Neither can it run away from them, for* **its legs are short and weak**; *they are* **not meant for running.**

This wonderful covering of sharp prickly spines is **its only means of defence.** If any enemy comes near, the hedgehog at once **rolls itself up into a ball,** and there are very few animals that care to interfere with those sharp bristling spines, which stand out from the ball on all sides.

5. *Tell that the hedgehog is provided with a* **powerful muscle,** *which springs from the back of the head, extends* **along both sides of the back-bone,** *and ends in a sort of loop near the tail. Show its position in the animal itself, or in the picture.*

It rolls itself up into a ball **by means of this strong muscle,** and remains securely rolled up in that way, till all danger is past.



6. *Notice that there are* **no prickly spines on the under parts** *of the body, for they would be in the way there. This part of the animal is* **covered with hair.** *Point out the purpose of this.*

*Notice too that when the animal is rolled up in a ball,* **every part of it**—*head, legs, tail*—**is covered up** *inside that bristling case of spines.*

7. *Pick up the hedgehog now, and let the children feel the spines.*

They are **hard** and **horny,** and yet they are **very elastic,** for they will bend between the fingers, but **they spring back again when left to themselves.**

*Tell that the hedgehog fell just now* **without hurting itself** *in the least, without any shake or shock,* **because it fell on these elastic spines.**

8. It is a well-known trick of the hedgehog, should it be surprised by an enemy on some high bank, to throw itself down the slope, curling itself up into a ball as it rolls. In this way it reaches the hard ground below, without appearing to suffer any harm from the fall, and once there unrolls itself and trots off without any further trouble.

## II. Build of the Animal

1. Body and Legs.—*Measure the hedgehog now with a foot-rule.* It is from **ten to twelve inches long**, and the body seems too big and heavy for such **short, weak-looking legs.**

*Remind the children that, although these legs are not meant for running, they are just the kind of limbs* **for rolling up in the middle of the ball.** *Long stout legs would be in the way, and so would a big tail. Notice the hedgehog's* **tiny tail,** *which is not more than an inch long.*

2. *Remind them that some animals, like the rat, require a long tail for climbing and swimming. But the hedgehog is* **neither a climber nor a swimmer**; *it has no need of a long tail, and this short one* **is easily stowed away** *inside the ball.*

*Point out too that, if the hedgehog had strong stout legs for running, it would not want its covering of horny spines. But with those spines for its protection,* **it has no need for legs to run away.**

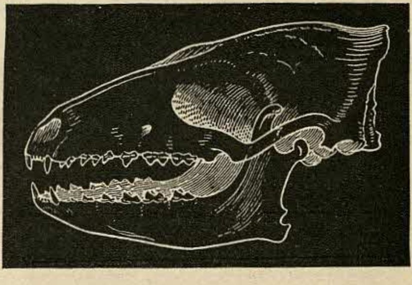
*Notice the feet next.* They are paws, and each paw has five toes, which are armed with strong blunt claws, for digging in the ground.

1. Head.—*Call attention to the peculiar* **pig-like head,** *which is joined to the body with* **scarcely any neck** *to speak of, and ends in* **a snout fitted for grubbing** *in the earth. Hence its name* **hedge-hog.** *It* **grunts** *and* **squeaks** *too very much as the pig does.*

*Notice also the loose flaps of skin which hang over the nostrils.* These animals were meant to get their food by grubbing in the earth, and **the flaps of skin serve to protect the nostrils.**

2. *Notice the eyes next.* They are like **small black beads,** but they are **very sharp.** The hedgehog is **a night-prowler**; its eyes are specially fitted **for seeing at night.**

3. *If a skull of the animal can be obtained, use it now for the purpose of examining the teeth. In the absence of an actual skull, show by means of a black-board sketch.*



On each side there are **three cutting teeth** and **seven large cheek teeth** in the upper jaw, and **two cutting teeth** and **six cheek teeth** in the lower jaw—thirty-six teeth in all. The cheek teeth have **broad rounded crowns,** and the jaw has only **an up-and-down movement.**

Such teeth are meant for **cutting and crushing,** but **not for chewing and grinding.**

### III. Food, Habits, and Nature

1. *Tell that the hedgehog is* **an insect-eater.** *Those broad-crowned teeth are just suited* **for crushing the hard cases of beetles and other insects.**

Tame hedgehogs are often kept in gardens and sometimes in the house to eat up cockroaches and other insect vermin. They are among **the gardener's friends,** for they have an enormous appetite, and will quickly get rid of all the vermin.

But these animals feed upon **worms, slugs,** and **snails,** as well as insects, and they will also catch and eat **lizards, rats,** and **mice,** and even **snakes.**

2. *Remind the children once more that the hedgehog is a night-prowler. Tell that it makes its home* **in the most retired spot it can find** *in the woods—very frequently in* **a hollow tree,** *sometimes in* **a crevice among the rocks,** *and sometimes* **in a hole in the ground under the large gnarled roots** *of some old tree. It sometimes even* **digs a burrow** *for itself.*

3. The bed is made of grass, hay, dry leaves, and moss, and in this snug nest the hedgehog and its mate live, and rear their family of young ones—usually **three or four at a litter.**

They are tiny little things, covered with soft hair. They have no prickly spines till they grow bigger.

The hedgehog lies in its nest asleep, rolled up in a ball, all day long, and **at night goes abroad** to hunt for its living.

4. *Tell that night is the best time to catch the hedgehog, especially with the help of a dog. The dog, as soon as he sees the animal, will give chase to it and bark round it, while the hedgehog,* **unable to run away, will roll itself up in a ball.** *It is then an easy matter to roll the ball into a handkerchief spread out on the ground, and so carry it away.*

The hedgehog not only sleeps in its nest all day long, but as winter approaches it curls itself up in a ball, goes to sleep, and sleeps till the return of spring. It is **another of the winter sleepers.**

Why should it sleep through the winter? Because there are no insects, slugs, snails, or worms for it to eat.

### SUMMARY OF THE LESSON

1. The hedgehog is a weak creature, unable to fight or run.
2. Its coat of sharp spines is meant to protect it from its enemies.
3. It feeds on insects, grubs, worms, slugs, and snails.
4. It sleeps in its hole all day, and comes out to feed at night.
5. It is a winter sleeper.

## Lesson XIV

## THE MOLE

The teacher will require Brown's picture of the mole, with details of the structure, and the mole's "fortress." A dead specimen of the animal would be most useful. A living specimen is very difficult to obtain even in the country, or that, of course, would be better than either.

### I. LIFE AND HABITS

1. *SHOW the picture of the mole, or, better than that, the dead animal, and better still (where it can be obtained) a live mole in a cage.*

*Ask for the name of the animal and proceed as follows :—*
Here is a little animal about **the size of a small rat.**

It lives wild in most parts of the country, and yet it is **very seldom seen alive.**

*Explain that* **the mole's home is underground,** *and at the same time point out that rabbits also live underground, but they are often seen frisking about in the fields.*

Why do we so frequently see rabbits ? They come out of their burrows morning and evening **to feed.**

What is their food ? Where do they find it ?

*In this way lead the children to tell that the rabbit burrows in the earth to make itself a snug home, safe from its enemies, where it can live and rear its young ; but that* **it must come to the surface to feed,** *and loves to scamper over the fields.*

2. *Now tell that the mole chooses an underground home, not simply because it is* **safe, snug,** *and* **cosy,** *but* **because the food on which it lives is underground too.**

It is **born** underground ; it **lives, eats, drinks, works,** and in all probability **dies** there.

What sort of food do you think it can find underground ?

*Excite the curiosity of the children, and then tell that—*

It is a **fierce, hungry little creature,** and would not be satisfied with such food as the rabbit eats. It **catches other little animals,** and eats them.

What sort of animals can we find in the earth?

What have you often found when digging in the garden?

*Lead the children in this way to think of* **worms** *and* **grubs** *that live in the ground. Explain that these are the* **natural food of the mole,** *and it is* **because he lives on such food** *that he makes his home in the earth.*

### II. How fitted to live Underground

*Proceed next, with the help of the picture, the animal itself, or both, to call attention to its structure, leading the children to notice point by point, the teacher as usual coming to their assistance only where they fail.*

1. Shape of Body.—The body is **long, thick, and round,** and the head is joined to it with a very **short, thick, strong neck.** The head itself is long, and **ends in a strong, pointed snout. All four legs are very short.**

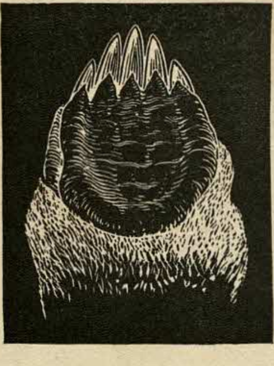
Which could you force into the soil best, a round stick pointed like a tip-cat, or a square blunt one? The **round, pointed one.**

The mole's head and body you see are shaped something like this round pointed stick. Can you tell me why? It is the best shape **for pushing its way through the soil.**

What is the object of that short, thick, strong neck?

Why are the legs so short?

*Lead the children to discover the use of the* **short, powerful neck** *in tunnelling through the earth, and show also that* **short legs are not in the way** *as long ones would be.*



2. THE FORE-PAWS.—*Call attention to the* **broad, flat, shovel-like paws,** *with their* **long strong claws.** They are **splendid digging tools.**

*Notice too that they are turned outwards, so that they can* **throw back the soil as they dig.** *Compare them with the hind-legs and paws.* **The front-paws do all the digging;** the hind-paws are used for throwing the earth behind as the digging goes on.

3. THE FUR COAT.—*Let the children feel the soft fur.*

The mole is really a handsome little animal, with his **black, glossy, fur coat,** as smooth and even as **velvet.** It seems **too beautiful a coat** for the damp, dirty soil.

Do you think he has much trouble to keep it clean? No, he has not, **for it never gets dirty.** Whenever the mole comes up from his tunnel, his coat is always sure to be **clean, smooth, and glossy.**

Let us see why this is; for we should get dirty enough if we had to crawl through the earth.

*Show and explain that the short hairs of the mole's fur* **grow perpendicularly up** *from the skin, and compare this with the fur of the cat, in which* **the hairs lie close to the body.**

*Notice too that in the cat's fur the little hairs are coarse near the roots and finer at the ends. Tell that in the fur of the mole it is just the opposite. The hairs are* **fine at the root** *and* **coarse at the ends.**

*Rub the cat's fur the wrong way and it ruffles up; but it does not matter which way the mole's fur is rubbed.*

It **bends easily either way,** and not only **never** ruffles, but **will not allow any of the soil to stick to it.** It all shakes off, as he moves to and fro in this underground home. The mole, therefore, although he lives in such a home, is never dirty.

*Notice how thick and close the fur is.* It makes a **snug cosy coat** to keep him warm, as he lies in the cold damp earth.

4. THE EYES.—*Elicit from the class that as the mole lives in the dark earth, where no ray of sunlight ever penetrates, he has* **little need for eyes.**

But think what would happen, while he bored his way in the earth with snout and paws, if his eyes were like those of other animals.

**Little particles of earth would get into them,** and cause him pain and injury.

*Explain that the mole's eyes are* **very deeply set,** *and* **completely hidden in the thick fur.** *People used to think the animal had no eyes at all, but if a newly caught mole is dipped in water, the eyes can be easily seen. They look like* **two little black beads.**

5. SMELL AND HEARING.—*Picture the mole in those dark underground tunnels. He must have some means of finding his way as he prowls about in search of his prey.*

*Tell that his* **sense of smell is very keen,** *and his* **hearing also very sharp.** *These guide him in place of eyes.*

A strange thing about the mole is that there are **no outer ears to be seen** like those of other animals.

*Let the children examine the mole and see that it is so. Tell or elicit why.*

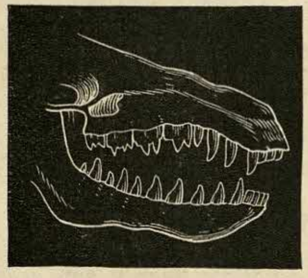
*In connection with the mole's sense of hearing, explain how easily sound travels through the earth. Tell that it is easy to hear the rumbling of the wheels of a cart at a very great distance, by putting the ear to the ground.*

The noise made by little animals forcing their way through the earth **is quickly conveyed to the mole,** and away he hurries after them.

*Picture a worm in the ground. How rapidly it draws itself back on the approach of danger.* **The mole must be very swift** *and rapid in his movements to catch his prey.*

6. THE TEETH.—*Examine the mouth next.*

The mole's teeth are **long, sharp,** and **pointed**—made specially **for seizing** and **tearing flesh,** not for chewing. He is a greedy ravenous little animal, and cannot go long without food.



When he cannot find enough food in the way of **earth-worms** and **grubs** in the ground, he sometimes makes his way up to the surface, and **catches and kills frogs, field-mice,** and **snakes.** The moment he has killed his victim he tears open its belly, thrusts his snout into it, and begins his meal by gorging himself with its blood.

The farmer lays traps to destroy the poor moles, for they do much damage to the crops by tunnelling in the ground. Yet, after all, they certainly do a great deal of good **by devouring grubs and beetles,** which would otherwise kill the growing plants.

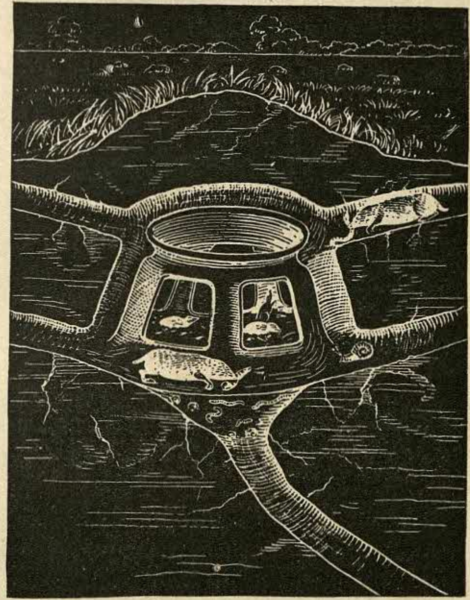
Would you expect the mole to be a winter sleeper or not? No.

Why not? Because when winter comes the worms make their way down into the ground, and the slugs and grubs bury themselves to get away from the frost. He can always find plenty of food in the ground.

## III. THE HOME UNDERGROUND

*Show a picture of the mole's fortress, and the galleries and passages leading to it, and endeavour to fill the children with admiration for the clever little miners and their work.*

*Notice that the* "**fortress**" *is always built on one plan. There is* **a circular gallery near the top of the mound,** *and* **another much larger below,** *and the two are always connected by means of* **five short passages.** *The* **middle chamber** *is hollowed out, and a quantity of* **dried leaves** *is piled up in it to form* **a warm snug nest,** *where the mole and his mate sleep, and where the young moles,* **four** *or* **five in a litter,** *are reared.*



*Notice the underground passages or* **runs** *leading to and from the fortress in all directions. These are* **always made wide enough to allow two moles to pass** *each other. If any danger approaches from one quarter they can make off in another, and so seek safety.*

*Tell that the mole-hills we see in the fields are simply heaps* *of earth which the little animals throw up during their mining operations.*

### Summary of the Lesson

1. The mole burrows in the ground, because it feeds on worms, grubs, and other creatures that live in the ground.

2. Its head, eyes, body, paws, and fur are all meant to fit it for its burrowing life.

3. The front paws are its digging tools. It throws up the earth with its hind-feet as the digging goes on.

4. Its teeth are made for seizing and tearing flesh.

5. The mole's home underground is a circular gallery with passages leading to it from all directions.

# LESSONS FROM BIRDS

## Lesson XV

## BIRDS AND THEIR COVERING

The teacher should be provided with: a bird of some sort, alive or dead, Brown's picture of young birds in the nest, a few quill-feathers from the goose, a sharp knife.

### I. Introduction

1. *Introduce the lesson by leading the children to mention some of the points of difference between birds and the other animals dealt with in former lessons. First as to their* **covering.**

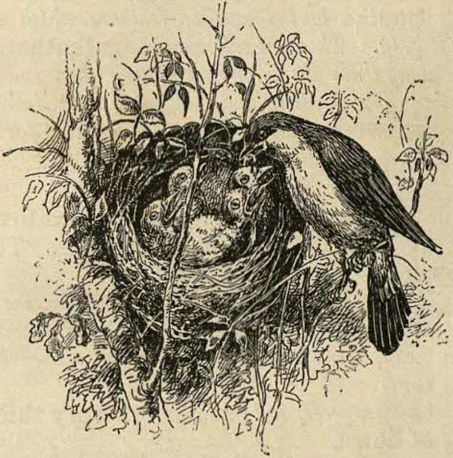
The cat, dog, sheep, cow, and rabbit have different kinds of coats. But how are all birds clothed? All birds have **feathers.**

2. Secondly, all those **animals,** and many more besides, **suckle their young** with milk from their own bodies. You all have seen the cat suckle her little kittens.

Now who has seen a mother bird and her young ones?

Does she suckle them? No; **birds do not suckle their young.**

*Let the children tell that the young ones are* **hatched from eggs** *which the mother bird lays, and that from the first the parents* **feed them with solid food.** *Show the picture of a nest of young birds and the old ones feeding them with worms.*



3. Again, all the animals we have studied live and move about either on or under the earth. What can you tell me about birds? **Birds fly in the air; they have wings.**

*Tell that there are other points of difference which we shall deal with as we proceed. These will be sufficient for the present.*

## II. Kinds of Feathers on the Bird's Body

1. Birds are clothed with feathers, the **lightest, warmest,** and **most beautiful** of all coverings. The feathers on the bird's body are not all alike.

*Show a bird of some sort either alive or dead.*

*Spread out the wings and tail, so as to show their long feathers.*

These we call the **quill-feathers.** The bird makes use of them in flying.

2. *Call attention to the smaller feathers which cover the whole of the body. These we call* **clothing feathers.** *Run the fingers along them the wrong way, and then smooth them back to their proper position, and notice how beautifully they are arranged,* **one overlapping the other** *so as to form a close-fitting coat.*

3. Beneath these clothing feathers, and next to the skin, are some very small, soft, fluffy feathers. These are called **down.**

*Picture the ducks and geese swimming about in the pond at the farm. The children know that these birds, as well as the great white swan, spend much of their time at all seasons of the year in the water.*

*Tell that ducks, geese, and swans have a* **very thick close covering of down.**

This close-fitting under-jacket of down is meant as a special **protection against cold.**

### III. PARTS OF A FEATHER

*Hand a few quill-feathers round the class for examination, and lead the children to point out the various parts, the teacher giving each its proper name.*

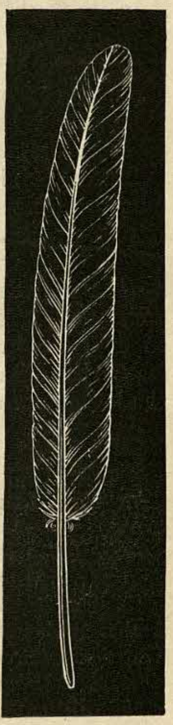
1. THE QUILL.—This is the **main stem** of the feather. Its **root** is fixed in the skin of the bird, just as the hairs are fixed in the skin of our bodies.

*Cut one of them across with a sharp knife.*

*Let the children examine it, and they will find that it is really a* **rounded, hollow tube.**

*Let them try to cut their quills. They find it is not such an* *easy matter as it seems, for although the quill is* **thin** *and* **light,** *it is made of a* **very strong, tough, horny substance.**

*Test others in various ways to show that they will* **bear a good deal of rough usage** *without breaking. When bent or twisted they spring back to their original shape. They are* **elastic.**



2. THE SHAFT.—This is the continuation of the quill to the tip of the feather. It is made of the same **tough, light, horny,** and **elastic** substance as the quill.

*Show that it has four sides—the upper and under sides* **smooth** *and more or less* **glossy,** *the other two sending off the long slender* **barbs** *right and left.*

*Strip one of the feathers and show the parts as they are described.*

**Cut open the shaft,** *and point out that, instead of being hollow like the quill, it is filled with a peculiar, light, tough, white substance, the* **pith.**

3. THE WEB.—*Show next the* **long, narrow, thin blades,** *which spring from both sides of the shaft.*

*Call attention to their* **tapering form.**

*Pluck one or two from the feather. We call them* **barbs.**

*Let the children see how they are arranged with their* **flat sides close together.**

*Show that they always* **point towards the tip of the feather** *and away from the quill.*

*Run the finger along the feather the wrong way, and show the barbs* **ruffled up**; *then draw it up the feather towards the* *tip, and show that the barbs at once* **close together again,** *and the feather is as smooth as before.*

4. *Explain that this arrangement of the barbs is not accidental. It is a wise design* **to keep the bird warm,** *and* **to assist it in its flight.**

It is for the same purpose that all the feathers on the body of the bird **point backwards.** As the bird moves through the air, its feathers are **pressed closer and closer to the body.**

*Show how great an assistance this is to the bird in its flight.*

Each **barb** is furnished at both edges with an immense number of slender **projecting fibres.** These are called **barbules.**

*Explain the meaning of the words—barb, barbule.*

The barbules are really little hooks, and it is their business to **interlock themselves** with each other, and so hold the barbs of the web close together. When the feather is ruffled up, these hooks are pulled asunder, and the barbules are separated.

### SUMMARY OF THE LESSON

1. Birds hatch their young from eggs, and do not suckle them.
2. All birds are clothed with feathers, which make the lightest and warmest of coverings.
3. The feathers of the wings and tail are called quill-feathers; those which cover the body are clothing feathers. Water-birds have an under coat of down.
4. A feather consists of the quill, the shaft, and the web.
5. All the feathers on the body of a bird point backwards.

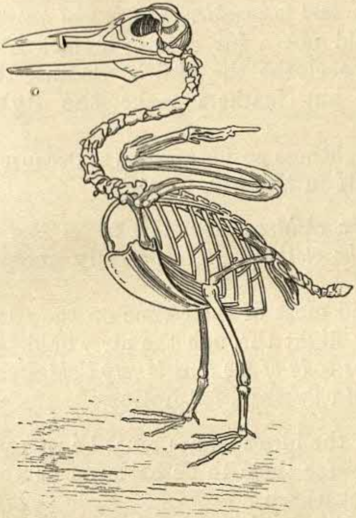
## Lesson XVI

### BUILD OF A BIRD

Provide for illustration: Brown's pictures showing the bony skeleton, and the heads and feet of birds; a bird of some sort, alive or dead. An actual gizzard of a fowl should be obtained if possible, and there should be a sharp knife for opening it.

### I. Birds have Hollow Bones

1. *Show the picture of the bony skeleton of a bird, or better*



*than that, an actual specimen if one can be obtained, and proceed as follows :—*

If we look at this bony framework of the bird, the bones appear to be quite as large as those of any other animal the same size. But if we could weigh the bones of such an animal, side by side with those of the bird, we should find a great difference between them.

The bones of the bird, although as large as those of most other animals its own size, are **very much lighter.** Let us try to find out the reason for this.

2. *Lead the children themselves to tell that in the bones of*

*most animals* **strength rather than lightness** *is the main thing necessary.*

They have **to support a heavy body,** and also **to provide the means of moving about** from place to place, by **walking, running,** and **leaping** on the ground. Hence such bones must be **thick and solid.**

3. *Pass on next to consider the life and habits of the bird.*

Why would not a fur coat or a thick hide do as well as feathers to clothe the bird? Because they would be **too heavy**; but feathers make **the lightest of all clothing.**

Why is lightness so necessary? Because the bird has to **raise itself in the air, and fly.**

4. *Lead the children from this to see that if lightness is necessary in the clothing, it is* **equally necessary in the body itself.**

Birds spend most of their time on the wing; but with a heavy body flight through the air would be impossible.

*Tell that the body of the bird is very light,* **because all its bones are** *not only* **thin,** *but* **hollow.**

5. But as the bird's bones must be so very light, why is it necessary for them to be as large as those of other animals? Let us see.

*Picture a bird in the act of flight. It moves through the air* **by constantly flapping its wings.** *Point out and explain carefully that large strong muscles are necessary* **to move the wings**; *that these muscles must be attached to the bones; and that therefore the bones themselves* **must be large and strong to support the muscles.**

*As an illustration of this, call attention to the* **broad flat bone in front of the body** *of the bird, with a* **deep keel projecting outwards** *from it.*

*Tell that this is the* **breast-bone.**

It is large and broad, because all the **great muscles which move the wings** in the act of flight **are attached to it.**

*Show the thick plump breast of the bird. Let the children feel it. This* **thick solid flesh** *which we call the* **breast** *is only another name* **for the muscles** *which move the wings.*

The bones of a bird then are **thin and hollow** for the sake of **lightness,** but at the same time they are **large and strong,** to **support the muscles**—especially the muscles of the wings.

## II. Wings instead of Fore-legs

1. The animals we have already studied have two pairs of limbs—**fore-legs** and **hind-legs.** We ourselves, in like manner, have two pairs of limbs—**arms** and **legs.**

*Show, by means of the picture or the skeleton, that practically the bird is built on the very same plan, except that* **it has wings instead of arms** *or* **fore-legs.**

The bones of the bird's fore-limbs are not quite the same as those of other animals, but we can easily distinguish the different parts.

2. *Point out the parts which answer to the* **upper-arm,** *the* **fore-arm,** *and the* **hand**; *and show how these are altered in form* **to serve the purposes of a wing.**

The bones of the fore-arm are **much longer** than those of other animals, and the **hand-part consists** practically of **a single piece,** to which the long feathers of the wing are attached. *There are the rudiments of the thumb and one of the fingers left. They should be pointed out.*

## III. Beaks instead of Mouths

1. *Show next the picture of the heads of birds, and ask the children to try to find out from these one more point in which birds differ from other animals.*

What is the first thing you notice? They all have **hard horny beaks** or **bills for mouths,** instead of **soft, fleshy lips** as other animals have.

2. Now look again, and compare the beaks one with another.

What have you found out? The beaks are **not all the same shape.**

Think for a moment about such animals as the cat, the horse, the sheep, and the rabbit.

What must we do when we want to find out the habits of any of these animals, and the kind of food they eat? We must **examine their mouths and teeth.**

3. *Tell that birds are as different in their nature, habits, and feeding as other animals, and we can find out all we want to know about them in the same way,* **by examining their mouths.** But we cannot see the teeth of any of these birds in the picture.

Can you tell me what kind of teeth birds have? **Birds have no teeth at all.**

Quite right. Birds have no teeth. Those **hard, horny beaks serve for lips and teeth all in one**; and they have **different shapes to suit the natures and habits** of different birds.

*Point out, however, that the beak is not made for chewing purposes.* **Birds do not chew their food** *as other animals do.*

*Show if possible the* **gizzard** *of a fowl. Cut it open, and call attention to the* **thick strong muscles** *outside, and the* **hard ridges of thick skin** *inside the organ. Tell that the food must pass through the gizzard, as it is swallowed, before it can enter the stomach. In all probability there will be some* **stones in the gizzard.** *Notice these. Tell that the bird picks up these stones from time to time. They act as a* **sort of mill for grinding up the food.**

### IV. Claws for Feet

1. *Show the picture of the feet of various birds, and point out that they are totally different from the feet of any of the animals we have already examined.* **We call the bird's feet claws.**

*Picture a bird in the act of alighting on a tree. Lead the children to tell that feet in the form of* **paws** *and* **hoofs would be useless to the bird. Claws** *are the only feet* **suitable for grasping** *the branch.*

2. *Remind the children that, in dealing with other animals, we found the feet to be quite as important as the teeth in helping us to decide as to their individual habits and nature.*

We never find the **foot of a horse** and the **mouth of a cat**, or the **foot of a rabbit** and the **mouth of a sheep**, in the same animal.

It is just the same with birds.

Although all birds have claws, we shall presently learn that there are many points of difference between the claws of one bird and those of another.

In every case the **nature, habits,** and **food** of the particular bird depend upon the **form of the claws** as well as upon the **structure of the bill.**

### SUMMARY OF THE LESSON

1. A bird is very much lighter than any other animal its own size.
2. Birds have thin hollow bones to give lightness to the body.
3. They have wings instead of fore-legs or arms.
4. They have horny beaks instead of teeth and lips as other animals have.
5. All birds have claws for feet.
6. The beaks and claws have different shapes to suit the natures and habits of different birds.

## Lesson XVII

## BIRDS AND THEIR BEAKS

Brown's picture of "Birds and their Beaks" will be required. An actual duck's head should be obtained if possible, to show the fringes on the mandible and tongue.

## I. THE HAWK AND THE OWL

1. *SHOW the picture of the hawk, or it might even be possible, through the keeper, to get an actual bird for the lesson. Most of the children know something of this bird.*

*Call special attention to the head. Notice the* **strong-looking, hooked,** *and* **pointed beak.** *Lead the children to discover that it has a* **cruel look**; *it seems exactly* **suited to the piercing eyes** *and the* **fierce-looking face** *of the bird.*

*Tell that this bird is as fierce and cruel in its nature as it looks.*

It chases, catches, and kills other birds on the wing, and feeds upon them, and its strong, pointed, hooked beak is just suited to the work of **tearing them to pieces.** We call birds of this class **seizers** or **birds of prey.**

2. *Show the picture of the owl next. This bird again is familiar to most country boys. Most of them know where to*

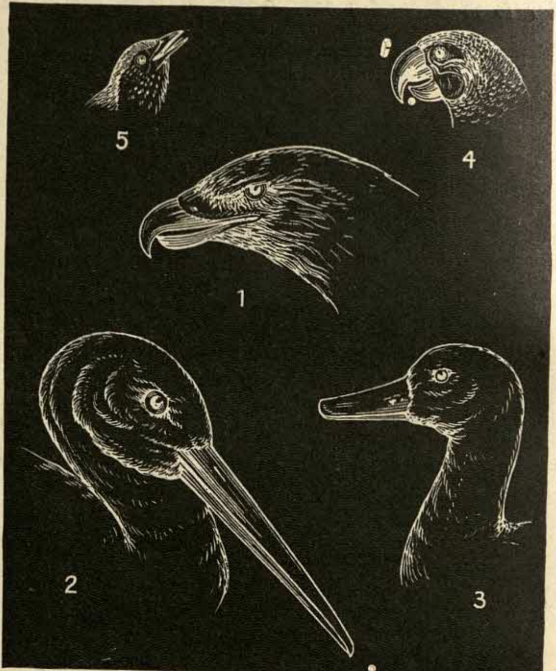
*look for the owl's nest* **in a hollow tree** *or* **in some old building.** *They are familiar too with its* **peculiar "hoot,"** *and they know that it is* **never seen abroad in the daytime.**

3. *Explain that this is another* **bird of prey.** *Call attention to the* **hooked beak.** *Tell that this bird, like the cats, is* **a night-prowler.** *Its eyes are not made to see*

*well in the day. They* **blink curiously in the daylight.** *But they are* **very sharp at night.**

*Tell that the owl* **feeds on rats, mice, frogs,** *and other small animals, which come out at night.*

4. *Say a word or two about the eagle and other great birds*



*of the same class—some of them big and strong enough to prey upon lambs, hares, grouse, and poultry-birds.*

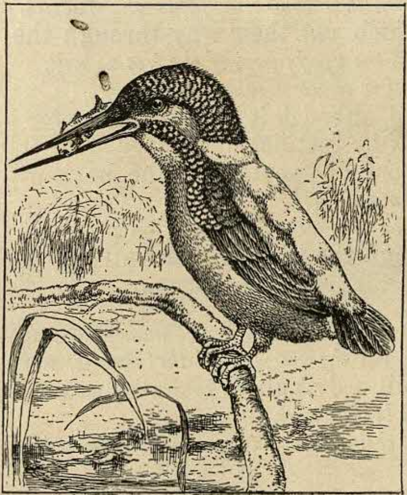
These are **the lions and tigers of the air.**

### II. THE KINGFISHER

*Show the picture of the kingfisher next, calling special attention as before to the head.*

*Tell that this bird lives by the* **banks of rivers,** *and* **feeds** *on* **fish, frogs,** *and other water animals.*

It is a most **clever fisher,** and is very **keen of sight.** Its quick eyes no sooner see its prey in the water, than it darts like lightning upon it, and the **sharp pointed beak pierces it through,** and brings it to the surface.



*Nothing more need be said now, except that birds of this kind are known as* **fishing birds.** *They will be dealt with more fully in the next lesson.*

*The beautiful* **kingfisher** *is probably well known to most of the children.*

### III. The Woodpecker

*The children's attention has no doubt been frequently called, during their rambles in the woods, to the tapping of the woodpecker on the trees.*

*Show the picture of the woodpecker in the trees, and call* *attention to the* **long, straight, pointed beak** *of this bird. Notice that the* **beak and the skull** *as well have a* **hard, strong, solid** *appearance.*

Let us find out what work this beak is meant to do.

1. *Explain that this bird feeds on* **worms, grubs,** *and* **insects, which eat their way through the bark,** *and often through the woody part of the tree as well.*

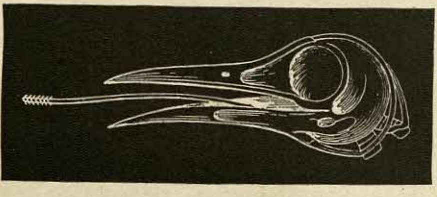
*Show a piece of worm-eaten wood.*

The bird, although it cannot see its prey beneath the bark, knows by **instinct** where they are. It appears to **find** them out by **tapping on the bark** with its beak, and then **listening.**

No sooner is it sure of finding its prey than it begins to **bore through the bark with its strong beak,** until it comes upon the spot where they are.

2. *Elicit now the reason for its name*—**woodpecker,** *and let the class tell the purpose of that* **hard, strong, solid-looking bill** *and* **skull,** *in connection with all this tapping, pecking, and boring work.*

*Lead the children next to see that a long, pointed beak would not be the most convenient means of capturing a number of tiny worms all wriggling to get off out of danger.*



3. *Describe the* **woodpecker's tongue,** *the most wonderful contrivance of all.*

It is long, narrow, and pointed, with a sort of **barbed tip,** and the bird is able to **thrust it** out suddenly a long way **beyond the beak.**

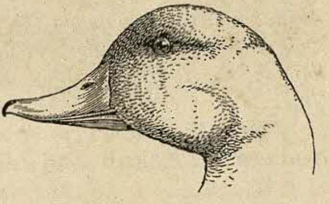
When therefore the strong beak has made the hole in the tree, and **exposed the insects** in it, the tongue instantly darts forward and seizes them before they can escape.

## IV. DUCKS, GEESE, AND SWANS

1. Here is another head. You know it, of course. It is a duck's head.

*Lead the class to notice the* **broad flat bill,** *different from any of those we have seen.*

*Show an actual head if possible. Point out that the* **bill is not hard,** *like those we have examined. It can be* **bent with the fingers.**

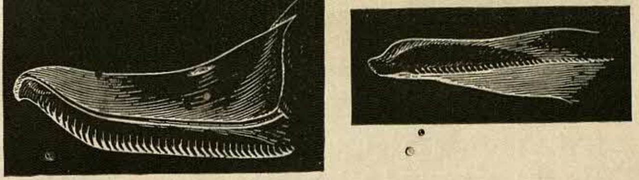


It **cannot** therefore **be meant for tearing flesh, for boring holes, or for stabbing.**

2. *Open the* **mandibles,** *and call attention to the* **fringe** *on the edges of the upper one.*

*Show the* **tongue.**

It is **large and fleshy,** filling the whole of the mouth,



and its edges are also furnished with **fringes like those of the beak.**

Now what is the object of this arrangement?

*Lead the children to tell from their own observation that* *these birds are fond of* **groping** *in the mud with their* **shovel-like bills.** *Show how admirably the bill is fitted for this work.*

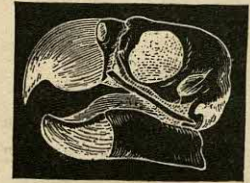
The mud and dirty water run out at the sides, but the **worms, insects, and grubs** that are in the mud **are caught** within **their fringed mouths** as in a trap. Like the woodpecker, they live on **grubs,** but they **catch them** in a **different way.**

**Geese** and **swans** belong to this class of birds.

## V. THE PARROT

*Show the picture of the parrot next. Tell that this beautiful-looking bird does not live in our fields and woods. Its home is in warm lands far across the sea. There the forests swarm with them, as the woods here do with our birds. Parrots are brought over to this country and kept in cages. They learn to talk.*

*Now notice the head of the bird. Point out that in this bird again both* **skull and bill** *seem* **made for strength.** *The* **hooked bill** *especially has a strong solid look. Notice that* **the lower mandible is shorter** *than the upper.*



*Some of the children are probably familiar with the bird from seeing it in a cage. Lead them to tell what they know from observation of its habits in the caged state—and especially its habits of feeding, and then proceed to explain that in its wild state it lives on* **nuts, berries,** *and* **fruits** *of various kinds, which it finds in the woods and forests where it lives.*

It uses its strong bill as its **nut-crackers.**

The **sharp, hooked point of the upper mandible** is very useful for this purpose.

Beaks of this kind are called **nut-cracking bills.**

It also uses its bill in **climbing the trees.**

### VI. Seed-eating Birds

*Pass on next to consider the bill of the* **black-bird, thrush, linnet,** *or* **sparrow.** *Lead the children to tell that these, and most of the birds they see in cages, have* **short, hard, strong beaks,** *shaped something like* **a cone.**

What food do we give to the birds which we keep in cages? **Bird-seed.**

*Tell that all the birds of this kind feed on hard seeds. They use their beaks* **to crack the husks of the seeds.** These beaks are not so strong as the parrot's beak. Why?

### Summary of the Lesson

1. Birds of prey have strong, hooked, pointed beaks for tearing flesh.
2. Fishing birds have long, sharp, pointed beaks for spearing their prey in the water.
3. Boring birds have strong, pointed beaks for boring holes in the bark of the trees to find worms, etc.
4. Some birds have flat bills, which they use as shovels for groping in the mud for their food.
5. The nut-cracking birds have hard, strong, solid bills, which are also useful for climbing the trees.
6. The seed-eating birds have short cone-shaped bills for cracking the husks of the seeds.

## Lesson XVIII

## BIRDS—THEIR LEGS AND FEET (1)

Provide for illustration: Brown's picture showing the feet of different birds, and the actual leg and foot of a fowl.

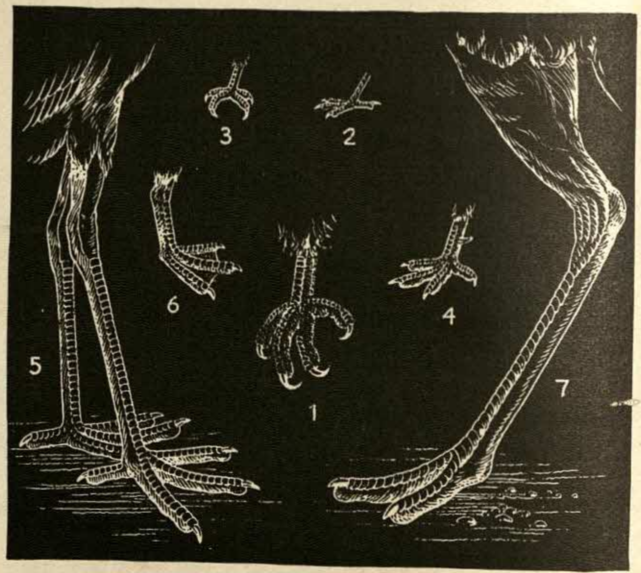
### I. Seizers, or Birds of Prey

1. *Introduce the picture, and commence by directing the attention of the children to the* **large, curved, strong-looking claw** *in the centre.*

*Notice that it has* **three long strong toes before,** *and* **one behind,** *and call special attention to the* **long, sharp, hooked talons** *with which they are armed.*

*Tell that these talons can be* **thrust forward** *or* **drawn back** *just like the claws of the cat.*

2. Now think of the heads of the birds which we examined in our last lesson. Which of those heads would this claw suit best? The head of the **fierce bird of prey.**



*Tell that this is the kind of claw which the owl, the hawk, and all birds of prey have. The* **fierce-looking eyes,** *the* **sharp hooked beak,** *and these* **terrible claws** *fit such birds to be the* **lions and tigers of the air.**

3. What kind of legs would you expect these birds to have? Very strong legs.

*Call attention to the leg in the picture. Notice that it is* **short, stout,** *and* **powerful-looking**. *Tell that these birds fight with their claws and talons, besides using them in carrying off their prey.*

Birds of this kind pounce down suddenly with great force upon their prey, **burying the sharp hooked talons in their flesh.**

With their powerful **wings** they then **raise** themselves in the air, and bear off the victim to their nest to devour it, **tearing** it to pieces with **beak and talon.**

Can you tell me now why we call them **seizers**? Because they **seize their prey,** and carry it off in their **talons.**

### II. PERCHING BIRDS

1. Now let us look at this foot—a claw, with **three long, jointed, slender toes** in **front**, and a **short one behind.** This is the kind of foot we find in the **sparrow, thrush, linnet, robin,** and most of the little birds to be met with in our fields and woods.

You have all seen a **sparrow** on the ground.

Who can tell me how it moves about? It goes with little **short hops.**

It cannot walk on the ground. Its long, slender **toes** are made for **grasping a branch or a twig,** and not for walking on a flat surface. Birds of this class **live almost entirely in the trees,** hopping from twig to twig.

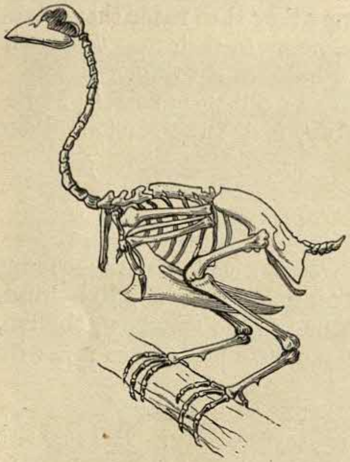
They sit or **perch on the branches,** and hence are called **perchers.** They even **sleep in this position,** and without the slightest fear of falling.

The strangest thing of all is that they **could not fall** from the perch if they wished. Let us see how this is.

2. I have here the **leg and foot** of a fowl. Look at this **glistening white flat cord,** which I can draw out at the upper part of the leg. It is very **tough** and **strong,** and it will not stretch.

What happens when I pull it? The **toes close up.** Now I let go, and you see the toes **stretch themselves out again.**

*Explain that this strong* **cord passes up the leg** *and over the* **front of the knee-joint** *to the great muscle of the* **thigh.** *Show that in the* **act of sitting,** *the bird must bend the knee-joint—that this bending of the joint* **pulls up the cord,** *and so* **draws the toes** *of the feet together without any effort of the bird itself.*



When the bird perches on a branch, the whole **weight of its body** is resting on its **legs,** and this keeps the knee bent.

3. The instant the knee bends, the toes draw themselves up so as to **clasp the branch,** and they **cannot unclasp it,** until the bird **raises itself** from its **perching position.**

*Show the picture of the skeleton of the bird.*

4. The arrangement is very similar in the claws of the seizers. When the bird **pounces** on its prey, and flies off with it, it naturally **draws it up** as close to its own body as possible to assist the flight.

This **drawing up bends the knee-joint,** pulls the cord, and makes the talons **close together** in the flesh of the victim.

### III. Climbing Birds

1. *Turn now to the picture of the claw with* **two toes in front** *and* **two behind.** *Compare it with those we have*

*already examined, and point out that there must be a good reason for such a marked difference.*

*Tell that this is the foot of the* **parrot** *and the* **woodpecker.**

*Lead the children to describe, as far as they can, the feeding habits of these birds, and show that in both cases* **the food,** *although different in character,* **comes from the trees. The birds must seek their food in the trees.**

*Elicit that in order to do this, such birds must be* **good climbers.**

2. These birds are **never seen on the ground.** They could only hobble about awkwardly on a flat surface. They **live in the trees,** because their food is in the trees, and in the trees **they are extremely nimble.**

We call them **climbing birds.** Those **claws** with two toes in front and two behind **are made specially for tree-climbing.**

3. *Picture a parrot in its cage, or, better still, show one where it is possible. Notice how easily it climbs.*

The parrot is **assisted in its climbing** by its **hooked beak.** It uses its beak as much as its claws in clasping the branches.

The woodpecker has to trust to its claws alone, but **it runs very nimbly up the rough bark of the trees.**

### SUMMARY OF THE LESSON

1. The birds of prey have powerful claws with sharp, hooked talons, which can be thrust forward or drawn back like those of the cat.
2. They use these claws for seizing their prey.
3. When a bird perches on the branch of a tree the weight of the body draws the claws together. They cannot unclasp the branch without raising the body.
4. Climbing birds have two toes in front and two behind.

# Lesson XIX

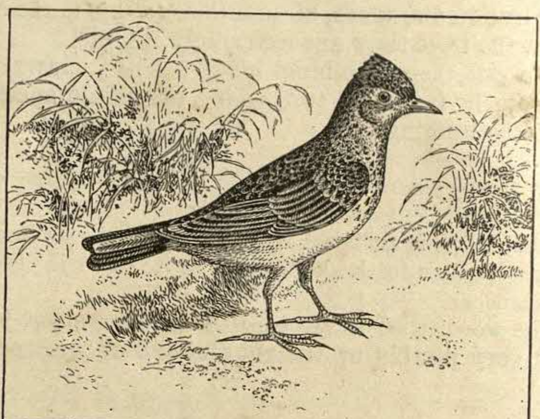
## BIRDS—THEIR LEGS AND FEET (2)

Provide for illustration the picture used in the last lesson, and the actual leg and foot of a duck.

### I. Walking Birds

1. *Show the picture, and let the children point out the three claws, which were dealt with in the preceding lesson.*

*Ask them for the names of some of the birds to which each kind of claw belongs, and so lead them to tell that these birds all rest in a perching position—that they are built for a life in the trees—that they* **cannot walk on the ground.**



2. *Call attention to the* **foot of the lark,** *noticing* **the long straight claw** *at the end of the* **hind toe.** *Lead the class to tell what they know of the habits of this bird.* **It does not live in the trees. It builds its nest on the ground.**

*Perhaps some of the children may have watched the bird on the ground. Elicit that* **it does not hop** like the sparrow; **it walks.** The lark is one of the very few small birds that walk on the ground. **That long straight hind claw is to assist the bird in walking**; but it is **not fitted for perching** in the trees.

3. *Compare it in this respect with the* **rooks.** *The children know that, although these birds* **perch in the trees** *at night, they spend most of their time on the ground, for* **they are to be seen in the fields** *constantly.*

*Some of the class will no doubt be able to tell from their own observation how these birds move about on the ground.* **They walk** like the lark. Their feet are **made for walking as well as perching.**

## II. SCRATCHING BIRDS

*Turn to the picture once more:—*

1. Let us next take this foot with the **strong-looking legs,** and **short, thick toes** armed with **strong, blunt claws.** It is the foot of our common hen. Such feet must be meant for hard work.

*The children of course know that these birds walk or strut about.* **Those feet are made for walking.**

*Refer to the fowls in the farm-yard, or on an ash-heap.*

What do they do there? They **scratch in the ground.**

Why do they do this? Their strong feet are given them **for the purpose of scratching in the ground,** in search of worms and grubs, which form an important part of their food. We call them **scratchers.**

*Ask the children to think of other birds that scratch in the ground in the same way.*

**Fowls, pigeons, turkeys, pheasants,** and **partridges** are all scratchers.

## III. Wading Birds

1. Look at this **long, slender leg and foot.** It belongs to a bird which lives near the water, and whose

**food is in the water.** Here is a picture of the bird itself.

Do you remember the long, sharp, pointed bill?

What is that for? To **catch fish.**

Quite right, and the long, **stilt-like legs** are to enable the bird **to walk** or **wade in the water** in search of its prey. We call these birds **waders.**

2. *Explain the meaning of the word* **"wade."**

*Notice the feet with the long, slender toes once more. Show that* **they spread out as the bird walks or wades.**

What is there at the bottom of the water? Mud or sand.

What would happen if the foot were small, and not made to spread out?

*Note the long* **necks,** *and ask their object.*

The **heron, crane,** and **stork** belong to the waders.

## IV. SWIMMING BIRDS

The next one is a peculiar-looking foot, with a skin or **web** stretching between the toes. We call it a **webbed foot.**

Look at it and tell me whether you have ever seen a bird with such a foot.

**Ducks, geese, and swans** have **webbed feet.**

*Show the duck's foot, and tell that* **such feet are specially fitted for swimming.**

*Notice at the same time that such a foot would be* **useless to a perching bird.**

These birds, as we saw in the last lesson, spend most of their time in the water, and **get their food out of the water. Their webbed feet enable them to swim.**

*The children will readily tell, from their own observation, how awkward these birds are on the ground.* **They waddle, rather than walk.** *These feet are made for swimming—not walking.*

## V. RUNNING BIRDS

*Show a picture of an ostrich. Give its name, and tell that this bird does not belong to our country. It lives in lands far across the sea.*

*Describe its great size and bulk, and note the comparative* **shortness** *of its* **wings.**

This bird **never flies.** It **runs with great rapidity.**

*Note the* **long, powerful legs.**

It does not swim, it does not perch. It has no need of long wide-spreading toes or webbed feet.

It has only **two short thick toes**, and they point to the front, so as to form **a solid support for the runner.**

### SUMMARY OF THE LESSON

1. Larks and rooks have feet for walking on the ground. They do not hop.

2. Poultry birds have strong thick toes with blunt claws for scratching in the ground.

3. Wading birds have long stilt-like legs, and long toes for walking in the water.

4. Swimming birds have webbed feet.

5. Running birds have strong legs, and two short thick solid-looking toes.

## Lesson XX

## SPRING

Brown's picture of Spring will be required for recapitulation work in class.

1. *The chief purpose of these lessons on the Seasons is to cultivate in all country children a spirit of inquiry, and the habit of observing for themselves the wonders of the lovely surroundings among which they are placed. It would therefore be well, with the break up of the frost and the gradual improvement in the weather, to encourage them to make their own simple observations on the changes that are taking place around them, and report to teacher from time to time.*

2. *He of course would guide them in the kind of observations they are to make, and note down for future reference the various reports they bring in to him.*

*Remind them at the start that* **they have seen Nature asleep.** *They must watch carefully from day to day everything that is going on around them now, for* **Nature is waking up out of her long sleep.**

*The lesson itself should be timed for some fine sunny day*

**about the middle of April,** *and would be best given during the course of an outdoor ramble.*

## I. The Days get Longer

1. *Before starting on the ramble, gather the children together in the playground, and have a few words about the* **lengthening of the daylight** *in the morning and evening, and the gradual change in the weather.*

*Commence by referring to their* **games and sports.** *What games do they like best? What is the best time for a good game?*

*Elicit in this way that their principal playtime* **begins after school is over** *for the day.*

*Remind them that a few weeks ago there was no time for outdoor games after school.* **It got dark so soon.**

2. *This will probably lead them to remember that it was* **worse still about Christmas time.** *It was* **quite dark then soon after four o'clock,** *and they were glad to hurry home quickly from school.*

*Elicit that since then the* **daylight has lasted a little longer** *every afternoon, till now they have a good time for play after school is over.*

3. *Pass on from this to talk about getting up in the morning. During those short dark days* **they almost wanted a light in the bedroom** *when it was time to get up; now it is* **quite light before they get out of bed.**

What do we learn from all this? We learn that **the sun now rises earlier in the morning,** and **sets later in the evening** than it did in the winter time. **The days are getting longer,** and the nights shorter.

## II. The Weather gets Warmer

1. What have we done with our great-coats, our warm wraps, and our thick warm gloves? We have left them off now; the weather is warmer.

Why is the weather warmer now? Because the sun shines longer every day.

But why should that make the weather warmer? Because the sun gives us **warmth as well as light.**

2. *Call attention to the shadows which the sun casts on the ground.*

At what time in the day are the shadows shortest? At noon.

Why is this? Because **at noon the sun reaches its highest point** in the sky.

Look at your own shadow on the ground now.

Is it longer or shorter than it would be on a winter's day at this hour? It is shorter.

Why? Because **the sun now mounts higher in the sky every day** than it did in the winter.

*Point out in this way that* the sun not only shines longer every day, but it mounts higher in the sky than it did in the winter. **It has more power to warm the earth.** Hence the **days are warmer** as well as longer.

3. *Still following up the idea of the children's games, lead them in the next place to talk about kite-flying. This is a good time for that sport, because there is plenty of wind.*

What is the name of this month? April.

What was last month called? March.

*Tell* (*or elicit from the children's own observation*) *that the winds at this time of the year blow mostly from the west, and remind them that we have already spoken of this as the rainy quarter.* **March winds bring April showers.**

*The children have of course observed that it often rains now.* **We get more rain at this part of the year than at any other time.**

**The warm sunshine** and **the rain** together **have been waking Nature** out of her long winter sleep. Come with me, and we will see how she looks now that she is awake.

### III. SILENT NATURE AWAKES

1. TREES AND HEDGEROWS BUDDING.—*Call attention on the way to the hedges and trees on all sides.* They are everywhere **tipped with green**—a soft, pale green.

*Lead the children to tell all about this.* These are **the buds of the new leaves.**

*Cut a twig, and let them examine the buds on it, carefully unfolding the tiny leaves one by one.*

*Point out that the buds are at first enclosed in* **little brown cases.** There are no cases on the biggest buds. What has become of them?

2. *Take the children to an* **elm, lime,** *or* **beech,** *and ask them to look on the ground near. It is* **strewn with these bud-cases.** *Shake the tree and watch them fall.*

These cases are meant to protect the little bud inside. The warm sun and the rain have **made the buds wake up** from their sleep, stretch themselves, and grow. As they grow, **the outside cases split** and **shrivel up,** and the wind then blows them away. **The buds can take care of themselves now.**

3. *Notice that some of the trees must have begun to* **wake up earlier than others,** *for they have already burst out into full leaf, while the buds of a few are still covered up in their brown cases. These, however, will wake up soon.*

When do we wake up from sleep? In the morning. **Spring** then **is Nature's morning of life.**

3. *Call attention now to the fresh green appearance of the fields and meadows on either side of the road.*

*Notice that* **the grass in the meadows,** as well as the trees and hedges, has been **waking up from its winter sleep,** and springing into new life. The sun and the rain are helping it to grow. It covers the ground everywhere **like a beautiful green carpet.** The other field looks green too, but it is **corn, not grass**, that is growing there.

4. *Tell that* **the grains of corn were asleep** *when they were drilled into the newly ploughed and harrowed field. But the* **sunshine and rain have been waking them too,** *and now they have* **sprung up into little corn-plants,** *stretching one after another from end to end of the field, just as they were drilled into the soil.*

1. BLOOM ON THE FRUIT-TREES.—*Notice in the next place the fruit-trees in the gardens and orchards. The leaves of the apple-trees are only just bursting out, but they are hidden by the clusters of large blossoms.*

What is the meaning of this? These trees not only bud into leaf in the spring, but they bear **beautiful flowers.** They must have been **waking up too,** for there were no flowers, or even leaves, on them in the winter.

2. *Pluck a blossom or two from those that happen to be in bloom, and let the children examine and compare them. Tell what they are, and explain that if we watch the trees from day to day, we shall see the* **beautiful flowers** *come and go, and in their place at last there will be* **tiny apples, pears, cherries, and plums.**

3. *Take the children into the wood or coppice now, and show them the* **beautiful white blossoms of the blackthorn or sloe.** *They are plentiful at this time almost everywhere;* **they come before the leaves.** *Tell what they are, and remind the children of the* **small black glossy fruit** *which comes from them in the autumn.*

4. *Find if possible* **a silver birch,** *and cut a twig of it to show its beautiful catkins, which are now in full bloom.*

This beautiful tassel is the blossom of the tree. It is made up of **an immense number of little flowers.** We call **this tassel of flowers** a **catkin.**

*The oak and the ash are also in flower during this month,* *but their catkins are not so beautiful as those of the birch. Show them if possible.*

5. *Most country boys and girls are familiar with the* **"pussy cats"** *of the willow, which they gather and call* **palms** *on or about Palm Sunday. If they are not all done now, cut one from the tree, and explain that these are* **the flowers of the willow tree. All these trees,** as well as the fruit-trees in the orchards, are **waking up from their long winter sleep.**

6. *Encourage the children to observe the trees for themselves during the next few weeks. They will find other trees, such as the* **beech, hawthorn** *(red and white may)*, **lilac, laburnum, Spanish chestnut, walnut,** *and* **horse-chestnut,** *all in succession bursting out into full bloom.* **They do not all wake up at the same time.** *Promise to show the children some of these when the time comes.*

7. WILD FLOWERS SPRINGING UP.—*During the whole of the ramble—in the green lanes, in the meadows, and in the woods—the children of course have been casting longing eyes on the wild flowers which meet them at every turn. Let them disperse for a time now, and gather themselves a posy, for needless to say no ramble would be complete without one.*

*On their return with the flowers the teacher would naturally (as they walk along) lead them to describe in their own way the* **primrose, violet,** *and other simple flowers that were dealt with in last year's course. Too much need not be attempted now, however, as flowers will be more fully discussed in a later lesson.*

*Impress upon them that here again,* in the form of these **beautiful wild spring flowers, silent Nature is waking up.**

## IV. MERRY NATURE AWAKES

1. *It would be well, when sending the children off for their flower-gathering, to call upon them to keep their eyes open, and bring back a report of anything they see.*

*One will probably say, on his return, that he saw a squirrel on the branch of a tree; another that the rabbits are running about near their burrows; another that he has found a bird's nest with little eggs in it; another that he heard the cuckoo; another again that he nearly caught a butterfly, and so on.*

2. *After dealing with the flowers, take these and any other similar reports one by one, and proceed to show again from them that* **Nature is waking up.**

*The children, through their earlier lessons, are familiar with the* **squirrel,** *the* **dormouse,** *and the* **harvest-mouse.**

*Lead them to talk about these little animals now.* They have been asleep all through the winter.

When spring comes **they wake up,** and **are full of life once more.**

3. **The birds,** you say, are **busy building their nests.** Have they woke up too?

*Lead the children to tell that, although the birds do not go to sleep in the winter, many of them leave us altogether before the cold weather comes, to return again, like the cuckoo and the swallow, in the spring. They come back to* **build their nests,**[1] **lay their eggs,** *and* **rear their young ones.**

4. Stand still and listen. **What a merry time this must be for the birds.** The air seems to be everywhere filled with their happy joyous songs.

Why are they so happy? Let us see.

*Dig up a little soil, and* **show a worm**; *turn over a stone or a brick, and there will probably be* **a snail or a slug** *under it. Remind the children that we did not find any worms in the ground in the winter.*

As soon as the winter frosts are over, **these creatures come up from their shelter deep down in the earth** to seek their food, and then some of the birds are glad to come back too.

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[1] Tell that unlike other birds the cuckoo builds no nest of her own. She lays her eggs in the nest of some other bird, and takes no more care of them. She never knows her young ones.

Why? Because **those birds feed on worms, slugs, and snails.** Ask the rooks, that are cawing in the field yonder, why they are so glad.

5. *Call attention to the* **humming, buzzing sound in the air.** *The children of course will readily recognise it. It is the* **hum of the bee.** *This little creature seems happy too.*

*Tell that when Nature awakes and brings the leaves and flowers, the insects, like the worms, make their appearance once more,* **because they know there is plenty of food for them.** *Some, like the bee and the butterfly,* **look to the flowers for their food**; *others feed on the* **leaves of the plants**—*but there is food enough for all, and so* **all are happy.**

6. Some birds, like **the cuckoo and the swallow, live entirely on insects.** This explains why they return as soon as spring comes with its flowers and insects.

**The birds could not live without the insects; the insects could not live without the flowers**; but spring provides for all.

7. *On the way home the children will no doubt be attracted by the* **bleating of the lambs** *in the field. Stand and watch them: Tell that the little lambs always come in the early spring. The mother sheep—or* **ewe**—*has either* **one or two lambs.**

Watch them frisking about by the side of their mothers. **Spring is clearly a happy, merry time for them.**

*Notice the* **thick heavy fleeces of wool** *on the old sheep. Those greatcoats, which kept them so warm during the frosts and snows of winter,* **are getting too much for them** *now that the weather is becoming warmer every day.*

*Point to the* **flecks of wool on the hedges** *and the rough trunks of the trees.*

The sheep are trying all they can **to rub off some of their thick woolly coats.**

In a few days the farmer will make them more comfortable, for **he will cut or shear it all off close.**

### SUMMARY OF THE LESSON

1. Spring is Nature's morning of life. Nature wakes up out of her long winter sleep.
2. The days get longer and warmer.
3. Plants begin to sprout and grow.
4. Fruit-trees begin to bloom, and wild flowers spring up.
5. Birds build their nests; winter sleepers awake; worms, slugs, and snails come out of their hiding-places; and insects begin to swarm.
6. The cuckoo and the swallow are here.
7. The young lambs come.

## Lesson XXI

## ROOKS

### OUTDOOR OBSERVATION

*It would be interesting to prepare for this lesson by setting the children to observe the rooks, and bring in reports of what they see from time to time. The various observations thus made might be noted down on a sheet of foolscap, and set up in a prominent place in the school. The paper would read somewhat as follows:—*

Week ending

*Feb.* 16*th.* Tom Jones saw some rooks with twigs in their mouths. They are all busy building their nests.

Will Smith says they make a great noise in the morning and evening.

John Brown found that one rook generally remained near the nest, while the other fetched the twigs. He sometimes found the rooks fighting, and making a great noise.

*Feb.* 23*rd.* Fred Allen reported that all the nests were made. The rooks now fly swiftly to and fro. They seem to like visiting the ploughed fields.

Tom Jones watched them feeding in a field. Several of the birds did not seem hungry. They did not feed, but only walked up and down, and looked about.

*March* 2*nd.* William Smith says fewer rooks fly about now; some remain in the nest all day.

Fred Allen saw a rook carrying something in its beak to the nest.

,, 9*th.* Nothing further to report.

,, 16*th.* Tom Jones says there is a squeaking noise in the nests. He thinks there must be some young birds in them now.

Several boys report that the old birds are very busy all day bringing food to feed the young ones.

,, 23*rd.* William Smith picked up a young rook under one of the trees after the rough wind of last night. It was quite dead, and had only a few fluffy feathers on it.

,, 30*th.* The young ones must be getting very hungry. The old birds seem to be always at work bringing them food.

*April* 15*th.* Several boys have been watching the old birds teach the young ones to fly. They would fly a little way off and then fly back again, while the young ones stood and watched them on the edge of the nest.

## I. The Rookery

1. *Commence the lesson by referring the children to the birds mentioned in the preceding lesson. Without exception they all live in pairs, and build their nests apart from other birds of the same kind. This will make a starting-point from which to follow up a comparison between such birds and the rook.*

2. The rook, unlike most other birds, is **seldom seen alone.** It is a sociable bird, fond of company; it **builds and lives near other rooks,** and **flies about with them.** A large number of nests are built close together in the highest branches of a group of tall trees—**generally** elms. This is called a colony of rooks, or a **rookery. Colony** *means a* **settlement.**

1. A Breezy Home.—*Call upon the children to tell from their own observation that the rooks start building* **early in February,** *before the leaf-buds begin to open.*

The nest is large, and rather clumsily built of **dry twigs,** which the birds either find on the ground or break off from the neighbouring trees with their strong beaks. These twigs, when twisted together, and firmly fixed between the forks of the branches, with some softer material as a resting-place for the eggs, make a fairly comfortable, if rough-looking nest.

2. *Refer the children to their own observations as recorded on the sheet of paper, and let John Brown tell what he observed while the nest-building was going on. Unless one of the birds remained to take care of the nest, there was almost sure to be a noisy fight.*

*Explain that during the building time rooks seem to be* **thieves by nature.** *One will* **steal twigs and any sort of building materials** *from another, wherever there is the slightest chance. It seems to be all right too, so long as they are not found out; but if one is caught in the act of stealing, all* **the rest of the community set upon him,** *beat him almost to death, and drive him away from the settlement altogether.*

It seems so natural to these birds to steal that **one is often left to keep guard like a policeman,** while the other flies away for more building materials.

3. *Picture the nests* **perched high among the branches.** *How they must sway to and fro in the windy months of spring. Lead the children to tell that:—*

Sometimes eggs, and even young birds, are found at the foot of the tree, where they have **tumbled out of the swaying nest.**

One day William Smith picked up a young bird, which had fallen out of the nest, and was lying on the ground quite dead.

They would be much safer on the thicker boughs of the tree lower down.

Why then build so high?

1. A SAFE HOME.—*Remind the children that the rook, like all other wild creatures,* **has many enemies.** *There is* **the farmer with his gun**; *there are* **mischievous boys**; *and there are* **cats and other flesh-eaters,** *that would steal and eat the young ones.*

The rook **builds high to protect itself and its young ones** from their enemies.

2. No animal—**not even a cat,** light as it is—**could climb so high.** It would be thrown off the swaying branches. *Compare the squirrel in its summer nest among the topmost branches.*

These birds seem to know that, although an accident may happen now and then, yet this is **the safest place for their young ones** till they can fly.

## II. STRUCTURE OF THE BIRDS

1. *It should not be difficult at the end of May to procure a dead rook, as this is generally the time when they are shot. Show one, and get the class to describe it:—*

This is **a large bird** although it is only a young one. The full-grown bird measures from fifteen to eighteen inches in length.

Its colour is **a glossy, deep blue-black,** the most beautiful feathers being those of the wing coverts and the neck. It has **black legs** and **claws,** and **a black beak.** It is a large black bird.

2. Is there any reason for this black colour? Let us see.

*Ask the children to tell the colour of the trunk, boughs, and branches of a tall leafy tree, as they appear against the sky when viewed from below. The* **branches look black,** *and even* **the leaves** *themselves* **throw dark shadows.**

*Tell that, as these birds make their home in the trees, the black colour is Nature's way of protecting them from their enemies.* It is difficult to distinguish a rook in a tall tree.

We could not, at a little distance, tell **a rook from a bough** in winter, nor could we find it in summer **among the dark shadows of the foliage.**

1. The Beak and Eyes.—*Notice the form of the beak. It is* **hard and strong-looking,** *and* **shaped like a cone.** *Remind the children that it uses its strong beak* **in its building work.**

*Refer to the lessons on birds. The form of the beak will always tell us the kind of food on which the bird feeds.*

2. Rooks **feed on worms and grubs,** which they either **root out of the ground with their strong bill,** or catch as they are turned up by the plough. *The children are of course all familiar with the sight of the rooks* **hovering about over the newly-ploughed field.**

The farmer likes them to catch these things, but when he finds them in his fields later on, he tries all he can to drive them away, for they are **very fond of seeds,** and will quickly root up and **devour all his newly-sown corn and peas.**

*The children will tell all about* **scarecrows, clappers, guns,** *and such-like devices to keep these birds off the fields after the seed has been sown.*

3. *Notice next the* **round, black, bright-looking eye.** *Tell that, as the bird hovers over the newly-ploughed field, those sharp eyes spy a worm the moment it is turned up, and with a single swoop the bird* **pounces down on it** *and swallows it.*

*Ask the children whether they have observed that these birds, while feeding,* **post sentinels here and there** *to warn them if any danger approaches.*

1. THE WINGS.—*Stretch out the wings by holding the tip of each, and let a boy measure while they are thus stretched.*

The rook has very **long broad wings** which taper to a point.

Why such large wings? This bird **flies long distances to feed.** It can fly very high, and is **very strong on the wing.** It is often seen to **fly against the wind.**

2. *The children will readily tell from their own observation how rooks fly round in a circle first, and then sail off swiftly in a straight line till we lose sight of them altogether.*

Why is this? While the birds are flying round in this way, their sharp eyes are **on the look-out for a good feeding-ground**; and as soon as they find one off they fly to it.

1. THE CLAWS.—*Examine these carefully. Pull the tendon and show how the bird is fitted for perching on the branches of trees.*

The rook has **three long, jointed toes in front** and **one behind.** It can **perch in a tree.**

How do most of the tree-birds move about on the ground? They hop; their feet are made for clasping the branches, but not for walking on flat ground.

2. *Point out that* **the rook finds its food in and on the ground.** *It spends more time on the ground than in the trees. Hence its toes are not so slender as those of the hopping birds;* **it can walk like a hen,** *and* **it can hop like a sparrow.**

*Notice at the same time that its toes and claws are not made, like those of the hen, for scratching in the ground.*

**It uses its beak, not its feet,** for rooting and grubbing in the ground for food.

### III. The Rooks and the Farmer

1. *Point out that, as rooks eat the vermin that are in the ground,* **they are of great use to the farmer,** *for no crops could grow if these creatures were allowed to live.*

*Notice, however, on the other hand, that these birds also eat the seeds which the farmer sows in his fields.*

2. Each nest in a rookery has **four or five young ones.** Therefore, as the numbers increased, the birds would not be able to find worms enough to live on. They would then have to devour the seed as it was sown. This of course would never do.

What does the farmer do to avoid it? He **shoots a large number of the young ones** every year, and so prevents them from increasing too rapidly.

Why not shoot the old birds. He cannot. Directly they hear the sound of a gun off they fly, and they are so strong on the wing that **they are soon out of reach of all danger.**

Then when must he shoot the young ones? He always shoots them before they are able to fly very far or very high.

### Summary of the Lesson

1. Rooks live together in great numbers. A colony of rooks is called a rookery.
2. They build their nests on the tops of tall trees.
3. Their feet are made for walking as well as perching, and their bills are hard and strong for rooting in the ground.
4. They feed on worms and grubs, but they also devour the farmer's seed.
5. They are of use to the farmer till the seed is sown; but after that he has to scare them off his fields.

# Lesson XXII

## OUR SONG-BIRDS (A SPRING LESSON)

Brown's picture of "Our Song-Birds" should be at hand, in readiness for the lesson.

### I. Introduction

*Commence with a brief reference to the stillness of the woods in winter.* What a difference now! The air is everywhere thrilling with the joyous songs of the birds. To-day we are going to learn something about our English song-birds.

*Show the picture and call upon the children to name as many of the birds as they can. Most of the group will no doubt be familiar to them.*

### II. Thrush and Blackbird

1. The Throstle.—*Call attention to the* **throstle** *or* **song-thrush** *in the picture. This bird of course is familiar to all. In some parts of the country it is known as the* **mavis.** *Proceed to describe it, calling upon the children to tell all they can*:—

It is **one of the largest** of our song-birds. It has a peculiarly **sweet, mellow, pleasing song.** The wings and back are brown; the **throat and breast white with dark-brown spots.** It feeds mostly on **slugs and snails,** and its beak is notched near the end for the purpose of securing its prey. Hence it ought to be reckoned as one of our friends; but it is also fond of fruit, and does considerable damage among the ripe cherries.

2. *Show the picture of the nest.* It looks like a large basin. It is well built of moss, roots, and dry grass, with often a thin inner lining of cow-dung and wool; and it is usually placed either in a fruit-tree, or in a low thick shrub or hedge. The throstle lays **five eggs.** They are **blue, with black spots** on the larger end.

1. THE MISSEL[1] THRUSH.—*Point this bird out in the picture.* It is larger than the throstle. It is **nearly twelve inches in length,** and is one of the most handsome of our song-birds. *Notice how well the* **yellowish-white breast, spotted with jet-black,** *shows up against the brown colour of the back, wings, and tail.*

2. *Tell that it has a* **rich, loud, clear-ringing song,** *which it often tries to raise above the noise of the tempest in stormy weather.* It may sometimes be heard in the stillness of the woods even in winter.

Its beak is notched near the end, and it feeds upon **insects, caterpillars,** and **grubs** during the spring and summer. In the later part of the year, **berries** and **other autumn fruits** provide its principal food.

1. THE BLACKBIRD.—*The children will readily point out this bird. It is well known to all of them. Tell that it gets its name from the* **rich black plumage of the male bird; the female bird is brown, not black.** *It is rather smaller than the thrush, and measures* **about ten inches in length.** *Notice the* **long yellow bill.** It is notched at the end like the bill of the thrush. *Tell that the bird* **lives mostly on grubs and insects,** *but it is also very* **fond of fruit,** *and does much damage in the orchards and gardens during the summer and autumn.*

2. *Notice the nest.* It is always placed in the middle of a thick bush,—**a holly-tree for preference**—and is made of grass and roots, with an inside lining of mud.

It looks like a rude earthenware cup, but it is always lined with fine grass, to form a soft bed for the **five greyish-blue spotted eggs** that the mother-bird lays in it.

3. This bird is noted for its **full, rich, mellow song.**

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[1] It gets its name from its fondness for the white juicy berries of the misletoe. They form an important part of its food in the late autumn and winter.

Although it generally sings in the daytime, it may sometimes be heard in the stillness of night.

### III. FINCHES AND LINNETS

1. THE GOLDFINCH.—*Let the children find the bird in the picture as before. Notice what a handsome fellow he is, and tell that his sweet merry song is as pleasing as his looks.*

This bird has a **crimson face, jet-black poll**, and **wings and tail** delicately marked in **orange, white, and black**. It is only about five inches in length, but it is one of the most beautiful birds of our English woods.

2. *Tell that it makes its nest either in* **a thick bush or hedge,** *or else* **among the thickest foliage of a tree.** *The nest is prettily built of grass, twigs, wool, and hair, with a lining of feathers, and is so cleverly placed that it is* **difficult to tell it from the colour of the tree itself.**

The eggs, **four or five in number,** are **bluish-white with purple-brown spots.**

3. The goldfinch is one of the farmer's best friends, for it not only feeds greedily **during the spring and summer** on **insects** which would destroy his crops, but in the autumn **turns its appetite towards weeds,** such as the **thistle, groundsel, burdock, plantain,** and others, which are then ripe and ready to scatter their seeds. The goldfinch devours these seeds instead, and so is **doubly a friend to the farmer.**

1. THE CHAFFINCH.—*Show the bird.* It is a **prettily marked bird,** about **six inches long,** although not so handsome as its cousin, the goldfinch; but its song is a **merry musical sort of whistle,** very pleasing to the ear.

In some parts of the country this bird is known as the "**pinck,**" because the call-note of the male to the female bird has something of the sound of this word.

2. The chaffinch, like the goldfinch, feeds upon **insects during the summer,** and **seeds in the autumn.**

*Tell that the nest (which contains from* **four to five buff-coloured, spotted eggs**) *is very prettily built of moss, wool, hair, and lichens,* **in the form of a deep cup**; *and is usually placed* **in the fork between a branch** *and one of the main boughs of the tree.*

**The greenfinch,** another member of the family, is one of our commonest birds.

1. The Brown Linnet.—*Have the bird pointed out in the picture. Tell that, although it has not a very powerful note, it is* **one of our sweetest songsters.** *Proceed to describe it as follows:—*

It is a **small brown bird** about **six inches long,** with the chin and throat parts grey, and the breast greyish brown. In the summer the brown feathers of the head are **tipped with red,** but the red tips disappear in the winter.

*Note that in some parts of the country it is known as the* **Red-poll,** *or* **Greater Red Finch.**

2. It feeds mostly upon **seeds,** and is especially fond of those of **weeds,** such as the **thistle** and **dandelion,** so of course it is **one of the farmer's friends.**

The nest, which contains **five blue eggs speckled or spotted with brown,** is built **sometimes in a high tree,** and **sometimes in a bush** low down near the ground.

The finches and linnets belong to the same family. They have short conical beaks, without any notch in the upper mandible.

## IV. The Skylark

1. *Let the children find this well-known bird in the picture. Remind them how we often stand still and listen to the* **rich wild melody of its stirring song,** *which seems to fill the air, although we cannot see whence it comes, till after a time we trace it as* **the merest speck in the sky,** *high up between heaven and earth.*

It begins its joyous song **early in spring,** and it sings continuously for fully **eight months of the year.**

2. *Proceed to describe the bird.* It is about **seven inches in length**; its wings and tail are of a sober **greyish-brown colour streaked with white,** and the **under parts are yellowish-white.** It has **a long bill,** and a **very long claw on the hind toe.** It is one of the few birds which **walk on the ground** instead of hopping. Its **feet are made for walking,** but not for perching on trees. It is **rarely or never seen in the trees.** The tree-birds hop on the ground; they cannot walk.

3. *Tell that the skylark's nest is* **always built on the ground,** *either* **in the meadows** *or* **among the growing corn.** *It is made of grass, leaves, and hair, and is* **so like the colour of the soil** *that it cannot readily be seen. The mother-bird lays* **four or five eggs** *of a* **yellowish-grey colour speckled with brown.**

*Note that this bird usually rears* **two families in one year**—*the first nest is built early in May.*

4. Larks feed mostly on **grasshoppers, beetles,** and **other insects and grubs,** which they can find in and on the ground, and the beak is notched like that of the thrush. But these birds also eat the **shoots of the young grass in the spring,** and the **growing grain in the corn-field during the summer.**

*Compare the skylark with* **the woodlark.** *Both birds are very much alike, but the* **woodlark is smaller,** *and has a short tail. Like the skylark* **it builds on the ground,** *but usually in the fields bordering on a wood. It seeks its food on the ground, and is* **a very swift runner.** *It even roosts on the ground. It has* **a sweet, pleasing, flute-like song,** *and like the skylark it sings mostly on the wing, although it does not mount so high in the air as that bird does.*

### V. THE WREN

1. *Show the bird.* It is smaller than any of those we have mentioned, for it is **only about four inches long**;

but it has a **sweet melodious note,** which seems too powerful to come from so tiny a creature.

The head, back, wings, and tail are a **reddish-brown colour**; the **under parts are paler.** It builds a **very cleverly-constructed nest** in the **shape of a ball** with an opening or **entrance in the side.** It is made of leaves, moss, grass, and lichens, and is usually placed **in a dense part of a hedge.** The mother-bird lays from **six to eight eggs.**

2. *Be sure to point out that this is not the same as the still smaller* **golden-crested wren,** *which is named from the crest on the top of its head. That bird is* **not really a wren at all.**

### VI. The Nightingale

1. *Show and describe the bird.* This, **the sweetest of our English song-birds,** is not remarkable for the beauty of its appearance, for it has a **dull sober-looking covering of brown,** with **greyish-white on the under parts.** It is about **six inches in length.**

It is a night bird; **it does not begin its famous song till after sunset.**

2. It makes a **loosely-constructed nest** of grass and leaves—**always on or near the ground,** and always where it is **well hidden among the foliage**; and the eggs—**four or five in number**—are of an **olive-brown colour.**

It feeds on **insects and grubs,** and is particularly **fond of caterpillars,** but it varies its diet **towards autumn** with **blackberries** and **other ripe fruits.**

### VII. The Robin Redbreast

1. *Let the children point it out. It is in an especial sense the children's bird. Their school songs have made them familiar with it, and they have more personal knowledge of it than of*

*any other bird, because unlike most wild birds it seems to take pleasure* **in coming near our homes** *and* **making friends with us.**

2. *Describe the bird.* It is about **six inches long**; its colour is **olive-brown,** with **a rich orange-red throat and breast.**

It feeds mostly upon **worms, insects,** and **grubs,** and may be seen following the plough in the spring, on the look-out for its food. In the winter it has to depend upon the **berries and other fruits,** that still hang on the bare trees; and when the frost and snow are very severe, **it hovers round our houses to be fed.**

3. Its **sweet pleasing song** may be heard throughout the greater part of the year, for it **commences to sing in the early spring,** and does not cease even in the hardest winter.

Its nest, which is made of leaves, moss, grass, hair, and feathers, is usually placed in **a thick bush near the ground,** or on a bank, and the eggs—**five in number**—are **white with small red spots.**

## SUMMARY OF THE LESSON

1. Thrushes and blackbirds are among the largest of our song-birds. They have a rich, mellow song. They feed on slugs, snails, and grubs, but they also eat the fruit on the trees.
2. Finches and linnets are useful birds, as well as sweet songsters. The finches feed on insects and grubs and the linnets on seeds during the summer, but both devour the seeds of weeds in the autumn.
3. The larks are made for walking. They live and feed on the ground. They are noted for their thrilling song.
4. The wren is one of the smallest of our song-birds. It builds a pretty nest, and has a sweet, musical song.
5. The nightingale sings its lovely song only at night.
6. The robin may be heard almost all through the year.

## LESSONS FROM PLANTS

N.B.—*It is intended that this lesson and those which follow it should be given in the order in which they stand, and as soon as convenient after the lesson on spring.*

*The first two, dealing as they do with the germination of seeds, will thus keep fresh in the children's minds the idea of* **Nature awakening to new life**; *while the others, which treat of the flower and its work, will find ample illustration in the wealth of actual living specimens everywhere ready to hand in the month of May.*

*If this is done it will be an easy matter for the teacher to keep alive the interest of the children through the coming summer and autumn.*

## Lesson XXIII

### SEEDS AND SEEDLINGS

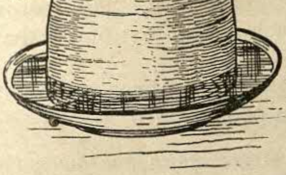
1. *In preparation for this lesson grow some carrot-tops and onions in water at intervals of eight or ten days between each one and the next. All that is needed is to cut off about an inch of the top of the carrot, place the cut surface in a small saucer of water, and stand it on a shelf in a warm sunny room.*

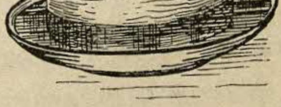
2. *The onion should be placed just as it is (root end downwards, of course) in the mouth of a bottle filled with water. It will grow best if kept for the first week or two in a warm dark cellar, and it will probably be necessary to fill up the bottle from time to time, for the water must touch the bulb.*

3. *Grow also some mustard and cress seedlings on flannel in a saucer of water. The seeds, after being soaked, should be spread on the flannel with a knife, and the flannel should then be placed in the saucer with just enough water to keep it moist. If kept in a warm place the seedlings will sprout and grow in a day or two. A carrot and a knife will also be required.*

## I. GROWING PLANTS REQUIRE FOOD

1. *Produce the growing carrot-tops. Select the most advanced specimen, and tell that it has been growing in the saucer of water for some weeks.* **The leaves are well formed and green.**





*Compare it with others in a less advanced stage, and point out the difference between the two.*

2. *Lastly, cut off a similar piece from the carrot which lies on*

*the table, and compare it with each of the others. Explain that they were all just like this when they were first put into the water.* **The leaves have grown out from the top of the root.**

3. What do plants require to make them grow? **They require food.**

How do growing plants get their food? Their **roots suck it up** out of the soil.

But there is no soil in these saucers. There is nothing but water; and **water alone will not make plants grow.** How then have these carrot-tops been able to grow and send out new leaves?

4. *Compare the fresh-cut specimen with the well-grown one. Lead the children to tell that the first is hard and solid throughout; the other is* **loose, soft, and flabby.**

*Explain that all this time the growing specimens* **have been feeding on their own substance,** *and so the pieces of carrot themselves have been* **wasting away,** *and* **getting smaller** *from day to day.*

*Tell that if we let them remain in the saucers, more and more leaves would continue to grow out, till all the food-supply was gone, and then the* **root part would appear withered up.**

5. *Now produce the onions that have been grown in the bottles of water. Notice that the most advanced specimen has sent out quite* **a cluster of root-fibres,** *which stretch down into the water, and that the stem is also making good headway above.*

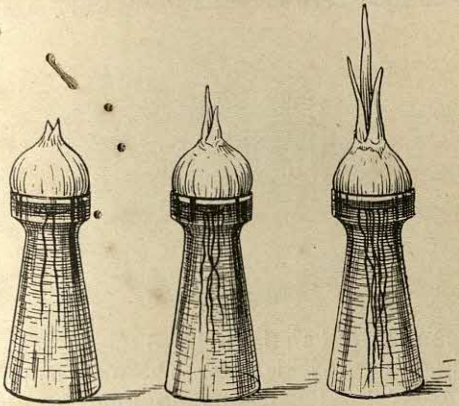
*Point out that the others are all growing too.* The reason why they have not grown so much as the first one is that they were put in later.

*Show that, in the latest of all,* **the root-fibres are just pricking through the bottom of the bulb.**

6. *Compare this onion with the one which has made the most growth. The latter is* **soft, flabby, and wasted,** *while the former is as* **hard and solid** *as ever it was.*

What is the meaning of this? These onions in the bottles, like the carrot-tops in the saucers, **have been**

**feeding on their own substance.** It is this food which has made them grow. But the onions themselves now



look wasted and flabby, because the growing parts have been sucking away their substance from them.

## II. Food-Store in Seeds

1. *Produce the mustard and cress seedlings growing on the flannel.*

*Show at the same time specimens of the actual seeds from which these little plants grew.*

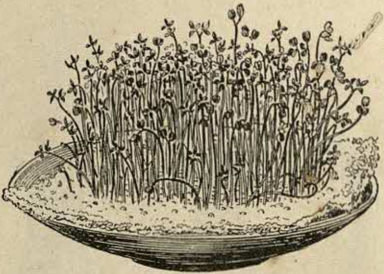
Think how big each plant is already, compared with the seed from which it sprang. They have all been **growing** ever since I first put them in.

What is it that makes little boys and girls grow big and strong? **The food which they eat.**

What do plants require, as well as ourselves, to make them grow? **They require food.**

2. Here is a big plant growing in a flower-pot. Can you tell me where it finds the food which it wants? **Its food is in the soil** in the flower-pot; **the roots of the plant suck up what they want.**

Just so. Now let us look at these little seeds. They began to grow as soon as they were put on the moist flannel, but **they had no roots** for sucking up food, and **there is no food here** for them to suck up.



They **cannot feed on flannel**, and there is nothing else in the saucer, except a little water to keep the flannel moist.

**The water** itself **contains no food** for the little things. Where then can the food have come from to make them grow?

3. *Explain that just as the carrot-tops and the onions* **grow by feeding on the food stored up in them,** *so it is with all seeds.*

**The seeds contain in themselves a store of food,** *to feed the little plants which come from them, till they get roots of their own, and can feed themselves from the food in the soil.*

The little plants which spring from the seeds are known as **seedlings.**

Look at our seedlings on the flannel. What will become of them when all the food laid up in the seed itself is gone? **They will wither and die,** for they **cannot get any food out of the saucer.**

## SUMMARY OF THE LESSON

1. Plants grow from seeds.

2. The seed contains a store of food to feed the little plant till it can get its proper food from the soil.

# Lesson XXIV

## HOW SEEDS GROW

Grow in preparation for the lesson some wheat and oats on a sponge, as the mustard and cress seed was grown on the flannel. This is easily done by fixing a large sponge in a cup, with just enough water in the cup to keep the sponge damp. If the seeds are sprinkled over the sponge they will soon begin to germinate in a warm room.

Grow also, in boxes of mould, some peas, beans, and corn for inspection. As these will be wanted in various stages of growth, it will be necessary to set the seeds at regular intervals, ranging from a month to a few days before the lesson; and of course they must be kept all the time under favourable conditions of warmth and moisture.

Some soaked beans, and grains of wheat, and a thin sharp knife will also be required.

### I. INTRODUCTION

*COMMENCE by showing the seedlings of wheat and oats growing on the moist sponge, and lead the children to tell, by referring them to the teaching of the preceding lesson, that these little plants, like the mustard and cress on the flannel, must have been* **living and growing on the food stored up in the seeds.**

Let us examine some seeds now, and see what we can learn about them.

### II. A BEAN SEED

*Produce the bean seeds that have been in soak. Let the children examine them and tell what they are. Explain that the reason for* *choosing large seeds like these and soaking them beforehand is, that we may be able to find their different parts easily. Hand them round the class, and assist the children in their investigation as follows:—*

1. THE TESTA.—*Notice first the* **loose wrinkled skin** *that covers the seed.*

*Compare with a seed that has not been soaked.*

We call this tough outer skin of the seed the **testa.**

*Call upon the children to point out its use as a* **protecting covering** *for the inner kernel.*

*Notice the* **long black scar** *along one edge of the seed. Tell that this scar marks the spot* **where the seed was joined to the pod** *in which it grew.*

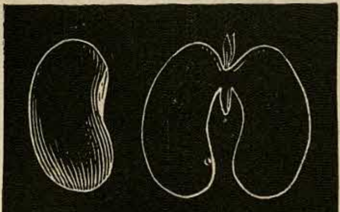
*Show a pod with seeds in it. A dried specimen from the school museum will answer the purpose.*

2. THE SEED-LEAVES.—*Slit the testa carefully with a knife, and remove it so as to expose the inner parts of the seed.*

*Show that the seed really* **consists of two pieces** *placed side by side.*

Each piece is **thick and solid.** We call them the **seed-leaves.**

*Point out that these seed-leaves are not separate, but are* **joined together by a sort of hinge** *on the side where we noticed the scar.*



*Spread the two parts open carefully to show the little hinge which joins them.*

3. THE GERM.—*Tell that* **this little hinge,** *as we called it, is* **the most essential part of the seed,** *for it is the part which is to grow into a new plant.*

We call it **the germ of the new plant.**

*Show its two parts—one called the* **plumule,** *pointing upwards; the other, the* **radicle,** *pointing downwards.*

*Have these two parts examined carefully. Point out that the plumule is really* **a tiny bud,** *which will make its way upwards through the soil, and* **form the stem and leaves;** *while the radicle will force its way down into the soil, and* **form the root of the plant.**

**Radicle** means **a little root.**

Each seed then contains in itself the **germ,** or **beginning** of a little plant—a tiny thing containing all the essential parts of a new plant—**root, stem, leaves**—and only waiting the opportunity to grow.

4. But what then is the use of the thick, solid, fleshy seed-leaves?

Let me tell you. These seed-leaves are thick and solid, **because they contain a store of food, sufficient to feed the tiny plant,** till it has grown big enough and strong enough to find its own proper food in the soil.

5. *Now that the parts of the bean seed have been clearly grasped, it would be well to hand round the class for similar examination smaller seeds of the same kind, commencing with a few* **peas, acorns,** *and* **almonds,** *the* **kernels from plum and cherry stones,** *and so passing on to* **apple-pips,** *and even some of the very small seeds of our common garden plants.*

*All these should be kept among the specimens in the school museum.*

*It cannot fail to interest the child to see that he is able to find exactly the same parts—***germ** *and* **seed-leaves**—*in the little seeds as in the large ones.*

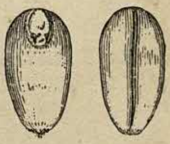
Our little seedling mustard and cress plants on the flannel lived and grew **on the food, which was stored up in the two seed-leaves** of the seed.

### III. A Grain of Corn

1. *Hand a few grains of wheat round the class. Call upon*

*the children to note the little* **rounded scar** *at the broad end of the grain. Tell that this scar marks the spot* **where the grain was attached to the ear** *in which it grew. Show an ear of corn, and point out where each grain is* **joined to the central stalk.**

*Tell that, like all other seeds,* **the corn-grain has its germ,** *which is to grow up into a new plant; but in this case the germ is so small that* **it all lies just under that little scar.**



2. *Cut the germ out of one of the soaked grains with a sharp thin pen-knife. Show it and explain that, like all other germs, it contains a radicle and a plumule.* **All the rest of the grain is the store of food, which is to feed the little plant** *when it begins to grow.*

*Tell that the* corn-grain is not made up of two thick seed-leaves, like the other seeds we have examined. **It is all in one piece.**

## IV. Seedlings

1. *Show now the peas and beans and little corn plants growing in the box of mould.*

*Commence with the beans and peas; and taking up one or two of the most recently set seeds, let the children tell what they observe.*

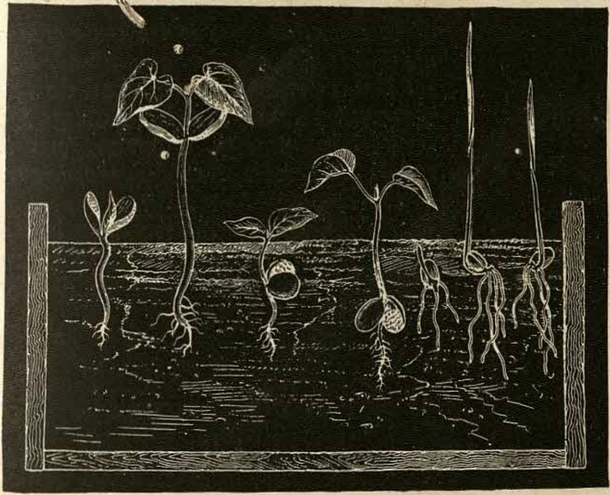
What do you notice about these seeds? The **outer skin** of all of them is **swelled** and **wrinkled;** in some of them it has **burst open.**

*Explain that this is the first effect of the moisture on the seeds, and then tell that while this has been going on, the* **warmth and moisture** *together* **have made the tiny germ wake up** *as it were from its long sleep, and stretch itself out.*

2. *Point out that until now the germ has actually been in a sort of sleep—alive, but* **showing no signs of life.**

The testa splits just when the germ is trying to force its way out; **for as soon as it wakes up from its sleep, it begins to grow,** and wants more room.

3. *Lift other specimens of the growing plantlets carefully one*



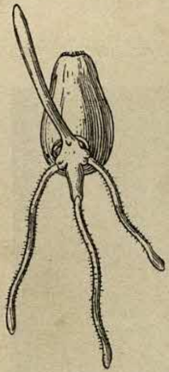
*by one, and let the children see for themselves the gradual development of the parts* **upwards** *and* **downwards.**

*Let them trace the radicle in successive plants—at first* **only a simple tap-root,** *very small, and forcing its way downwards into the soil; then gradually sending off (as it increases in size)* **tiny branches** *or* **rootlets** *all round.*

4. *Follow the upward growth of the plant in the same way. Show one specimen* **with the seed-leaves just opening,** *and the plumule forcing its way upwards between them.*

*Then pass on to another* **with the seed-leaves just making their way above-ground,** *and the growing bud of the plumule already in the act of bursting into leaf. Then show one with* **the seed-leaves withered and falling off.** *Their feeding work is done.*

N.B.—*Note that* **the seed-leaves of the pea do not make their way above the surface.** *They remain buried in the soil; but they too wither and fall off when their work is done.*



5. *Show that there is the same gradual growth in the case of the corn-grains. Point out that these plants* **never send down a tap-root first. A whole cluster of root-fibres spring at once** *from the radicle, and make their way downwards into the soil.*

*Tell the reason. The food-store in these seeds is very small, and* **the little plants have to get their own food from the soil very early in life.**

## SUMMARY OF THE LESSON

1. Most seeds have two seed-leaves with the germ between them like a little hinge.

2. The corn-grain is all in one piece.

3. The germ of the seed consists of the plumule and the radicle.

4. The plumule grows upwards, and forms the stem and the leaves.

5. The radicle (little root) makes its way down into the soil.

## Lesson XXV

## SOME WILD SPRING FLOWERS

Brown's picture of "The Wild Flowers of Spring" will be required for recapitulation work in the schoolroom.

### TIME—EARLY MAY

*This lesson is intended to teach the children in a practical way how to recognise and name the different parts of a flower; the work of those different parts will follow in another lesson.*

*It would be well, therefore, to confine the attention of the children for the present to those flowers, which were dealt with in a simple way in the lessons of last year's course, e.g.* the **primrose, violet, blue-bell,** and **daisy**—*all of which are in full bloom now.*

*The children of course will be delighted to gather bunches of flowers in readiness for the lesson.*

## I. INTRODUCTION

1. *Call attention to the flowers on the table; ask for their names, and proceed to elicit all the children can tell about them from their earlier lessons. They will readily point out the flower-leaves, the little slender stalks standing up in a sort of ring inside, the pollen-cases at the top of the stalks, and the one stouter stalk in the very centre.*

2. What is the lower part of this central stalk like? It is a sort of **case or box.**

What should we find in it? It is **full of little seeds.**

Then what work does the flower do for the plant? **It produces seeds,** which will afterwards grow up into new plants.

Let us see what we can learn now about these different parts of a flower.

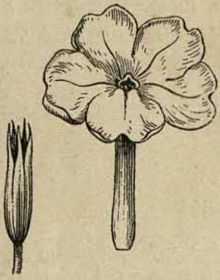
## II. THE CALYX

1. *The primrose affords an excellent example of a perfect flower. Instruct the children to take one in their hand, and observe the* **little, rough, green, cup-like tube,** *which holds the flower to the flower-stalk.*

*Separate this part carefully from one of the specimens, and* *show that all the rest of the flower* **fits into it.** Let the children do the same with their specimens.

This little green cup is called the **calyx.**

*Let the children examine it, and discover for themselves that*



PRIMROSE.

SWEET VIOLET.

*it consists of* **five small pointed leaves,** which are joined together at their edges **to form a sort of tube.**

2. *Compare with the violet. Point out that* the violet, like the primrose, has a calyx or cup of **five pointed green leaves,** but **they are all separate**—they do not form a tube. We call these leaves which form the outer cup of the flower **the sepals.**

Remember the primrose and the violet have **five sepals.**

## III. The Corolla

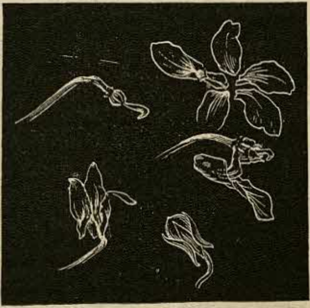
1. *Turn to the primrose once more, calling attention to the* **delicate pale-yellow flower-leaves,** *which rest in the middle of the calyx.*

*Examine these.* They are **five in number,** but in the middle and lower parts they are **joined together** at their edges **to form a tube.**

They are **larger than the sepals of the calyx;** they **spread out widely** and are **notched** at their edges; and instead of being coarse and green, they are **soft and velvety to the touch.**

These flower-leaves are **the petals,** and the ring or circle which they form is known as **the corolla** of the flower.

*Dissect a flower to show this, and instruct the children to find in their own specimens all the parts named.*



VIOLET DISSECTED.

2. *Compare the primrose with the violet.*

The corolla of the violet, like that of the primrose, has **five soft, delicate, richly-coloured petals;** but **they are all separate.**

*Dissect the flower as before to show this, and call attention while doing so to the peculiar* **spur on the lower petal.**

BLUE-BELL.

This flower is altogether different in shape from the tube-like primrose.

*Notice its rich* **violet** *colour, and its* **delicate perfume.**

3. *Compare both now with the blue-bell.*

The flower-leaves in this are joined together at their edges from bottom to top, so that they form **a beautiful little bell-shaped flower.** Hence their name.

But instead of five **there are six flower-leaves here,** as we can see by counting their pointed ends at the mouth of the bell.

*Notice as before the* **richness of colour** *and the* **delicious scent** *of this flower.*

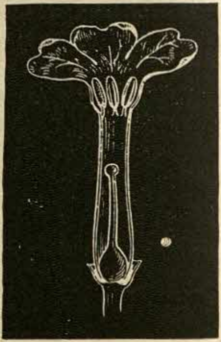
4. *Show from what has been said that the* **number of sepals and petals** *is* **not the same** *in all flowers. The* **primrose** *and the* **violet** *have* **five of each set,** *and one set is altogether different from the other. The blue-bell has six in all—***three of each set,** *but sepals and petals are so much alike in form and colour, that* **no difference can be seen,** *and all six are joined at their edges to form the bell.* **This form of flower is called a peri-anth.**

*Explain that the beautiful flower-leaves, although so bright and gay,* are **not the most important parts of the flower.** Those parts are hidden away in the very centre.

## IV. THE STAMENS

1. *Cut away carefully with the scissors the 5-lobed circle at the top of the primrose now, and call attention to the inner circle or* **whirl of stamens,** *letting the children do the same of course with their specimens.*

Here we have, growing inside the flower-tube, **five slender stalks,** with a **little knob at the top of each.** These stalks are the **stamens,** and the little knobs are called **anthers.**



2. These little knobs are really **hollow cases,** and are full of that **fine powdery dust,** which we call **pollen.**

*Open some of the anthers, and show the pollen by dusting it on a sheet of paper. The children have already been made familiar with it in their earlier lessons.*

*Show that the violet, like the* **primrose, has five stamens; the blue-bell six;** *and that each stamen has* **its little anther full of pollen.**

## V. THE PISTIL

1. *Remove the stamens from each flower now, and show that there is still another part left, the children following the teacher's example as before.*

We have at last arrived at the most important part of the flower. It stands **in the very centre,** surrounded by all the other parts. We call it the **pistil.** It consists of two parts, the **ovary** and the **stigma.**

*Assist the children to find the pistil in their own specimen flowers.*

2. THE OVARY.—*Call attention to the lowest part of the pistil now. Make the description quite clear by sketching on the black-board the parts named.*

The lower part of the pistil is swollen out larger than the upper part. It forms a sort of **case** or **box,** which is called the **ovary.** This ovary is the **fruit of the plant.** It is the **seed-vessel.**

It contains a number of tiny rounded bodies, the **ovules,** arranged in regular order, side by side.

These little **ovules** will in time become **seeds.**

3. *Select a suitable specimen from among the flowers, and notice the ovary—***the fruit of the plant.** *It was formed from the lowest portion of the pistil.*

*Split it open carefully and show the ovules in the seed-vessel. We call this kind of seed-vessel a* **capsule.**

*Show, and compare with this, the ripened ovaries of the violet and blue-bell.*

1. THE STIGMA.—*Examine the upper part of the pistil*

*next. Tell that this is the* **stigma,** *and proceed to describe it, the children assisting where they can.*

It is of a **loose spongy** nature. In some flowers the stigma rests immediately upon the top of the ovary, but in the primrose, violet, and blue-bell it is joined to the ovary by a long, slender stalk—the **style.**

*Show this in the specimens.*

2. *Explain that every flower has not all these four parts—* **calyx, corolla, stamens,** *and* **pistil.**

*Some flowers have a* **calyx,** *but* **no corolla,** *some a* **corolla,** *but* **no calyx.**

*In some we find a* **pistil,** *but* **no stamens,** *in others* **stamens** *but* **no pistil.**

Which of these must be present if the flower is to produce fruit and seeds? The **pistil.**

Why? Because the fruit with its seed-vessels is really part of the pistil itself.

The primrose and violet have all these parts. They are perfect flowers.

3. *It will be amusing as well as instructive now to hand the children some daisies, and ask them to point out all these parts in this flower.*

*Some of the class may remember that this is not a single flower, like those we have examined, but* **a whole cluster of tiny flowers on one head.**

*In any case dissect and explain, showing* **the centre** *and* **ray florets,** *and the separate parts of each.*

## SUMMARY OF THE LESSON

1. The sepals form the outer cup of the flower, which is called the calyx. The sepals of most flowers are coarse and green.

2. The corolla, or inner cup of the flower, is formed of soft, richly-coloured petals.

3. The stamens are little stalks in the middle of the flower. They support the anthers, which are full of pollen.

4. The pistil is in the centre of the flower. It consists of the stigma and the ovary.

5. The ovary is the seed-vessel—the fruit of the plant.

During the coming week the teacher would do well to encourage the children to gather, and bring in for comparison, other wild flowers of the season. The flowers available will to some extent depend upon the locality, but in most woods the anemone, periwinkle, daffodil, and yellow dead nettle are plentiful enough about this time; as are also the buttercup, cowslip, coltsfoot, and lesser celandine or pilewort in the meadows and on the banks.

## Lesson XXVI

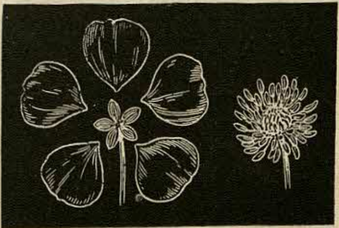
## THE FLOWER AND ITS WORK

### TIME—MIDDLE OF MAY

*PROVIDE for illustration a collection of all the common wild flowers named in the lesson; a fuchsia in flower; and Brown's picture showing the flowers of the oak, ash, birch, willow, alder, and hazel.*

### I. INTRODUCTION

*By way of introduction it would be well, either now, or some time before the lesson, to set the children themselves to dissect some of the simple flowers on the table, assisting them of course where it is necessary.*


BUTTERCUP DISSECTED.

1. *The* **cowslip and oxlip—funnel-shaped flowers,** *with five sepals, five petals, five stamens,* **closely resemble the primrose,** *which has already been examined, except that they are* **a deeper yellow,** *and are* **spotted near the base.** *Compare the two.*

2. **The buttercup** *has also five sepals and five petals, but*

*there is* **a whole cluster of stamens** *in the centre. Compare it with the* **marsh-marigold,** *which has* **only one set of flower-leaves**—*five sepals.* **It has no petals;** *but like the buttercup it has* **a thick cluster of stamens in the middle.**

3. *The* **wallflower, lady's smock or cuckoo-flower,** *and the* **tiny flower of the watercress**—*all in bloom now—afford examples of another class of flowers. They have four sepals, four petals, and* **six stamens,** *two of them shorter than the rest.*

4. *Have the names of the various parts of the flower*—**calyx** and **sepals, corolla** and **petals, stamens, anthers, pollen, stigma, ovary, ovules, pistil**—*written on the black-board as they arise.*

Let us now trace the work of the flower, from the time when it first makes its appearance, till it withers and drops to the ground. For this purpose we will examine some of these wallflowers.

WALLFLOWER.

II. THE FLOWER-BUD

1. *Lead the children to think of the leaves as they first begin to show themselves in the spring.*

What do we call them? What are they like? What becomes of them?

*Show that among the flowers on the table there are some which have not yet opened. They look something like the swollen leaf-buds. Explain that* **they are real buds,** *that* *they would have* **burst open in time,** *and that when they do open they send out, not leaves, but* **flowers.**

We call them **the flower-buds.**

2. *Pluck one of these flower-buds, and let the children examine it for themselves. Open it carefully and show that* **there is an actual flower inside it.**

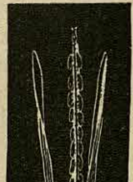
What is this green outside covering? It is the **calyx.**

Why is it wrapped so closely round the flower? It is meant **to cover up** the tender parts inside.

*Strip off the sepals one by one,—there are* **four of them,**— *and show that these thick, coarse, green leaves form* **a splendid protection** *against the* **wind, rain,** *and* **sun.**

3. *Show next how carefully the* **four petals are folded round** *the delicate young stamens and pistil.*

The **smooth velvety surface** of these inner flower-leaves **forms the softest of coverings** for those tender young stalks, till they are big and strong enough to bear exposure to the weather. **When that time comes** the **petals open,** but not till then.



### III. ANTHERS, STAMENS, AND PISTIL

1. *Call attention once more to the bursting flower-buds. Explain that the bud swells from day to day,* **because all parts of it are growing,** *and that by the time the petals open, the* **pistil** *in the centre is* **larger than any of the other parts.**

*Show the actual* **pistil** *of a newly-opened flower, and let the children point out the* **ovary** *at its lower end.*

*Cut it open carefully, and ask them to examine it, and describe what they find inside.*

What do we call this double row of little grains in the ovary? We call them **ovules.**

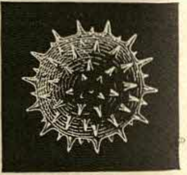
What becomes of them? They grow bigger in time, and become **seeds.**

2. *Explain that the most curious part of it is that, although these tiny ovules are all there in the ovary, they could never grow into actual seeds of themselves.* **They require something to make them grow.**

*Show the* **anthers of a full-blown flower,** *and call attention to the* **yellow dust** *which falls from them when they are shaken.*

*Let the children give its name*—**pollen.** *Tell that this pollen has a most important work to do, for* **it is the only thing that can make the ovules grow into actual seeds.**

3. *Point out further that the pollen is prepared in the anthers, and that it must make its way from them, by some means or other,* **into the ovary where the ovules are,** *before it can do its work.*



POLLEN-GRAIN.

Let me show you how the pollen gets into the ovary, for that, after all, **is the most important part of the work of the flower.**

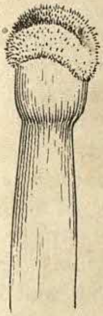
When the anthers reach their full size, **they ripen** and **burst open,** and then of course the **powdery pollen,** which fills the little cases, is **scattered,** and **some of it falls on the pistil** which stands up in the midst of them.

4. *Sketch the whole arrangement on the black-board, and call particular attention to the* **stigma** *at the top of the pistil.*

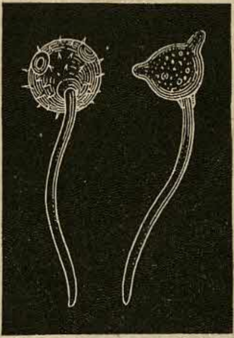
*Explain that this part of the pistil is of* **a loose, spongy nature,** *and show on an actual specimen that it is kept* **moist by a sticky fluid which oozes out from it.**

The **broad sticky head** of the stigma forms a **trap to catch some of the pollen,** and each little yellow grain of pollen-dust is no sooner lodged there than **it begins**

**to grow,** and force its way down through the spongy substance, **till it reaches the ovary and the ovules.**



STIGMA OF PISTIL.



POLLEN-GRAINS GROWING.

There it acts on the tiny ovules in a wonderful way, by conveying to them **a little quantity of fluid, which fertilises them,** and makes them grow into seeds.

*Explain that, when the pollen from the anthers falls in this way upon the stigma of the pistil, which stands in the midst of them, we say* **the flower fertilises itself.**

## IV. All Flowers cannot Fertilise Themselves

1. *Now show the growing fuchsia in the pot. Notice in the first place that all these* **flowers hang down.** *We say they are* **pendent.**

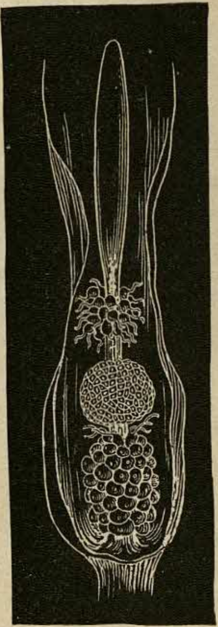
*Let the children next point out the* **stamens** *with their anthers, surrounding the* **bigger, stouter stalk of the pistil.**

*Observe that the* **pistil is much longer than the stamens,** *and that in consequence the knob at the end of it* **hangs below the anthers.**

*Show that as the stigma is on the under side of this knob, it is impossible for the pollen to fall upon it from the ripened anthers, when they burst.*

**No pendent flower, whose pistil hangs below the anthers, is able to fertilise itself.**

2. *Show next the spadix of the* **arum** *or* **cuckoo-pint.**



CUCKOO-PINT.

*This well-known flower is now in bloom, and may be found in the woods and hedgerows everywhere.*

*Call attention to the* **fleshy spike** *which stands up in the centre, and point out the* **two rings of tiny flowers,** *which are packed closely* **round its lower part.**

*Explain that a magnifying-glass proves these flowers to be* **of different kinds.** *Those in the* **upper ring have stamens,** *but no pistils; those in the* **lower ring have pistils,** *but no stamens.*

The curious part of it is that the two sets of flowers **do not ripen at the same time**; those of the lower ring ripen first, and when, some time after, the anthers of the other set ripen, **it is too late for the pollen** in them **to be of any use.** Such a flower **cannot fertilise itself.**

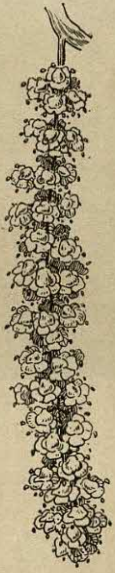
MALE FLOWER OF THE SALLOW WILLOW IN CATKIN.

3. *Remind the children now of the peculiar flowers which we found a few weeks ago on the* **oak,** *the* **ash,** *the* **birch,** *and the* **willow.** *Tell that these*

*flowers are over now, so we must be content with a picture instead.*

CATKIN OF BIRCH.

CATKIN OF OAK.

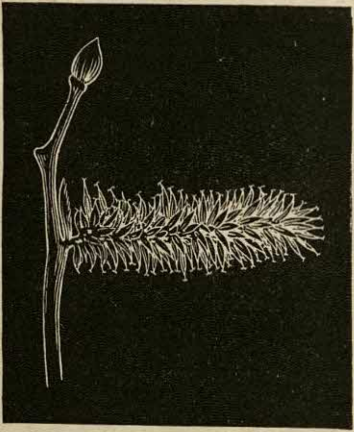


CATKIN OF ALDER.

*Point out each of them in the picture, and show side by side with them the similar flowers of the* **hazel** *and* **alder**, *which bloom in February and March. Promise to show the actual flowers of these two last-named trees, when the season for blooming comes round again.*

CATKIN OF ASH.

4. *Tell that most trees of this kind bear two sorts of flowers.* **One flower has a pistil, but no stamens; the other has stamens, but no pistil.**

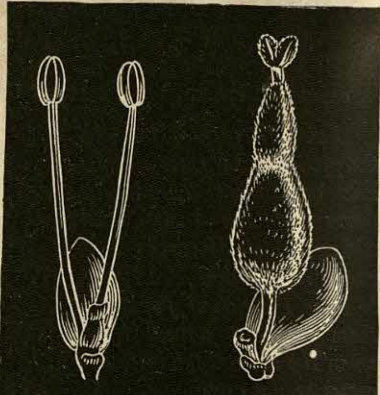


FEMALE FLOWER OF THE SALLOW WILLOW IN CATKIN.

*Elicit from the class that flowers with a pistil are the only ones that can produce seeds, and explain that it is usual to call them* **female flowers,** *while* **those with stamens only are known as male flowers.**

*The hazel affords a good example of these. Show the male and female flowers in the picture.*

*Point out that* as these two kinds of flowers grow on different parts of the branch, it is clear that **none of them can fertilise their own seeds.**



I. SINGLE MALE FLOWER FROM CATKIN OF WILLOW.
II. SINGLE FEMALE FLOWER FROM CATKIN OF WILLOW.

5. *Lastly, show the male and female flowers of the willow.* The female flowers grow on one tree, and the male flowers on another; but **both kinds of flowers never grow on the same tree.**

It is quite clear, therefore, that **such flowers cannot change their own ovules into seeds.**

*Tell the children that these are a few simple facts about flowers for* *them to think over, and promise to explain more about the matter in another lesson.*

### SUMMARY OF THE LESSON

1. The calyx and corolla are meant to protect the delicate parts inside the flower.

2. The pollen fertilises the ovules, and makes them grow into actual seeds.

3. Male flowers have anthers, but no pistil; female flowers have a pistil, but no anthers.

4. The male flowers often grow on one plant, and the female flowers on another.

5. Very few flowers are able to fertilise themselves with pollen from their own anthers.

## Lesson XXVII

# INSECTS AND FLOWERS

### TIME—EARLY JUNE

*PROVIDE the teacher with a good collection of common wild flowers in season; a bee (either alive under a glass, or a dead specimen); a drawing of the bee's tongue; the sweet-scented tobacco plant (Nicotiana affinis) in bloom in a pot; a spray of common lime in blossom; and the picture used in Lesson XXVI. showing the male and female flowers of the oak, birch, willow, hazel, alder, etc.*

### I. INTRODUCTION

1. *Commence with a brief recapitulation of the subject of the last lesson, to elicit from the children all they can tell of the nature of the pollen, and its work in fertilising the ovules.*

*Remind them that if all flowers were made on the same plan, we should naturally expect to find each one able* **to change its ovules into real seeds with pollen from its own anthers.**

*Lead them to tell that in many flowers this is impossible, because:—*

(*a*) Some flowers have **stamens but no pistil**, and therefore no ovules to be fertilised. These are known as **male flowers.**

(*b*) Some, although they have a pistil with ovules in it, **have no stamens,** and **therefore no pollen.** These we call **female flowers.**

(*c*) Some pendent flowers, although they have both pistil and stamens, cannot fertilise their own ovules, because the stigma hangs below the anthers, and **the pollen cannot fall on it.**

(*d*) Some flowers **do not ripen their pistil and anthers at the same time.**

(*e*) **Certain plants bear only one kind of flower**—male or female—but not both.

2. *Tell that as a matter of fact* **very few flowers are able to fertilise themselves.** *By far the greater number* **could never produce seeds from their ovules** *but for the help which they get from outside.*

We are now going to learn what this outside help is, and what effect it has on the flowers. It is **one of the most wonderful and beautiful things in Nature.**

Let us begin by trying to find something in the flowers which we have not yet noticed.

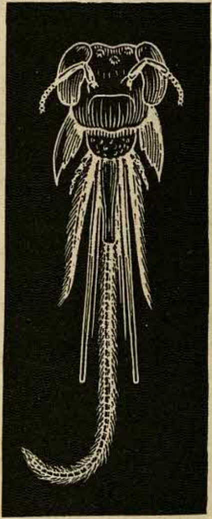
## II. Honey in the Flowers

1. *Take a few common flowers of various kinds, and examine them one by one to find the* **honey-glands.** *Notice that although these glands are not always in the same part of every flower, they are in each case* **deeply set in or near the flower-cup.**

*Lead the children to tell of the* **bees,** *and* **their visits to the flowers.**

They visit the flowers **to get this honey** from them. It is their **natural food**: they **live on it** while the flowers are blooming, and **they store it up** in their hives to feed them in the winter, when the flowers themselves are all dead.

*Explain that not only bees, but* **moths, butterflies, wasps, flies,** *and hosts of other insects go to the flowers for their food* — **the honey from these honey-glands.**

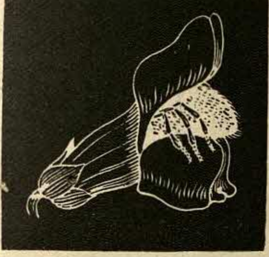


BEE'S TONGUE.

2. *Show a picture or make a blackboard sketch of the* **bee's tongue,** *and explain that this is specially* **fitted for sucking up the honey,** *as it collects in these little bags or glands.*

*Imagine a bee in the act of getting the honey from some flower. Lead the children to tell that, as the honey-glands are always placed far back in the flower-cup,* **the bee must force its way in** *to get at them, thrusting aside the stamens, and most likely* **bursting some of the anthers** *if they are ripe.*

3. *Show an actual bee, either a live one under a glass, or a dead specimen.*



BEE ENTERING A FLOWER.

*Call attention to its* **hairy body.** *Picture the* **shower of pollen dust** *falling from the broken anthers. Some of it* **lodges on that hairy body** *as it falls, and* **remains there.**

*Tell next that, as each flower provides only the smallest drop of honey, it is necessary for the bee to* **visit many flowers,** *one after another, before it can get* **as much as it wants** *to carry home.*

*The children will readily tell the rest. Elicit step by step.* The bee, dusted like a miller **with pollen from one**

**flower,** visits another directly afterwards, and forces its way in, **without the least intention of doing any good to the flower itself,** bent only on the one purpose of finding its food.

The very act of pushing its way through this second flower **to get to its honey-gland,** must **brush off** and **shake off some of the pollen,** which clings to its hairy body. This **falls upon the stigma,** and so, in the most unexpected way, **the pollen from one flower** is made to **fertilise the ovules in another.**

## III. Colours and Scents of Flowers

1. *Refer to the last lesson, and lead the children to describe the useful purpose, which the petals and sepals serve in* **protecting the tender parts of the flower,** *round which they are folded in the bud. Elicit too that the soft, smooth, velvety surface of the inner set of these flower-leaves, and the coarse, rough nature of the outer set are part of the same wise design.*

*Pass on from this to consider the* **ever-varying tints** *and* **colours of the flowers.** Our eyes are constantly delighted with these brilliant colours.

But have you ever thought why the flowers are bright and gay?

Those bright colours are no mere accident. They, too, are meant to serve a wise purpose. It is **the bright colours of the flowers that attract the insects** to them.

2. Now take these flowers in your hands, and see if you can discover something else about them, which you did not notice while they were lying on the table.

What do you observe as soon as they are brought near your nose? They have a **sweet perfume** or **scent.**

*Remind the children that many of our wild flowers, as well as those we grow in the garden, have their own well-known perfume.* **They scent the air all round.**

3. *But much as we love the sweet perfumes of the flowers,*

*they have a far more important work than that of simply pleasing our sense of smell.*

The **scent of the flower,** as well as its bright colours, is meant for the express purpose of **attracting the insects** to it.

*Tell that* **different insects seek different flowers,** *and that the varying colours and perfumes* **lead them to the flowers they like best.**

4. *Hold up a white and a red campion side by side.*

Which of these flowers would be best seen at night? The white flower.

*Ask the children to note for themselves* **how very distinctly all white flowers show up at night** *against the surrounding darkness.*

*Let them smell the two flowers.* **Both are scentless.**

*Tell that if they search for these flowers in the woods some evening, they will find that* **although the pink ones are still scentless, the white give out a sweet perfume.**

5. *Among cultivated flowers the* **sweet-scented tobacco plant** (*Nicotiana affinis*) *affords a familiar illustration of the same thing; and as it is now a common plant in nearly every garden, the children will find no difficulty in observing it for themselves, in the daytime and at night.*

*Show one in a pot now, and observe that* **its blossoms are all closed.**

*Notice, too, that although it is called a "sweet-scented" flower,* **there is not the faintest perfume in it.**

*Tell that as the evening comes on* **these white flowers open wide,** *and at the same time (like the flower of the white campion)* **they fill the air all round with their sweet odour all through the night.**

6. What is the meaning of this?

*Explain that both are* **night flowers**; *that certain insects (moths, for example) fly by night rather than in the daytime; and that* **the white colour and the rich scent** *of these flowers* **attract such insects in the dark,** *while other flowers are passed by unnoticed.*

*Such flowers, on the other hand, are* **quite deserted in the daytime, for the bees never visit them.** *They prefer the richly-tinted, sweet-smelling flowers of daylight.*

### IV. FLOWERS WITHOUT HONEY

1. *Lead the children in the next place to think about those peculiar flowers of the oak, ash, birch, willow, alder, and hazel which we spoke of in the last lesson. Notice the following points :—*

(*a*) These flowers are either **male** or **female**; but **they never contain both pistil and stamens** as well.

(*b*) Some of them **produce no honey,** and **have no attraction for insects,** either in the form of bright colours or sweet perfume.

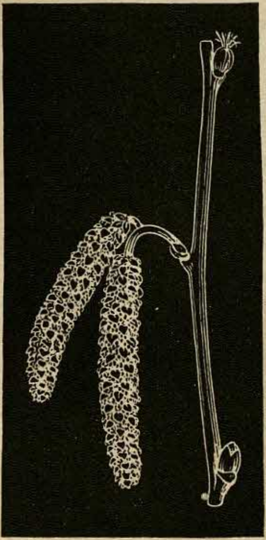
(*c*) **Such flowers are never visited by insects,** and therefore insects can take no part in fertilising their ovules.

2. How then are they fertilised ?

*Explain that the* **wind does for them what the insects do for other flowers.** *It carries the pollen from the anthers of one flower as they burst, and leaves it where it is wanted—on the pistil of some other flower.*

3. *Contrast this again with* **the blossoms of the lime.** *These trees are now in full bloom.*

*Show a spray of the blossoms. Call attention to their* **fragrant smell.** *Tell that these flowers, although very small,* **contain an abundant supply of**



HAZEL: SHOWING MALE FLOWERS IN HANGING CATKINS, AND FEMALE FLOWERS AT THE NODES.

**honey.** *Their fragrant smell attracts the bees to them.* **They are always crowded with bees.**

The bees, and not the wind, do what is wanted here.

### SUMMARY OF THE LESSON

1. Insects visit the flowers in search of the honey which is stored up in the honey-glands.
2. They carry on their bodies the pollen from the anthers of one flower to the pistil of another.
3. Insects are as necessary to the flowers as the flowers are to the insects.
4. The sweet scent of the flowers is for the purpose of attracting the insects to them.
5. The bright gay colours of the flowers are for the same purpose.
6. Night flowers are almost always white.
7. Flowers with neither honey nor scent are not visited by insects. The wind scatters the pollen from one flower to fertilise another.

## Lesson XXVIII

## OUR FEATHERED VISITORS

Brown's picture of "Our Feathered Visitors" should be provided.

### I. INTRODUCTION

*COMMENCE by comparing once more the death-like scene of winter with the* **busy, joyous awakening of spring-time.** *In the one there are very few birds to be seen, in the other birds are everywhere—all of them full of busy life, building their nests, rearing their young, flying here and there in search of food, and so on.*

*Tell that many of the birds we see at this time of the year* **are only visitors;** *they come to stay with us during the summer, but* **they always leave us before the cold weather returns.**

*Point out that, in the same way, there are some birds* **that visit us and stay with us only in the winter,** *always returning to their other home as spring comes round again.*

To-day we are going to see what we can learn about these visitors.

## II. Reason for Change of Home

*Point out that, when the tropical regions become burnt up, owing to the intense heat, most of the birds* **begin to find a scarcity of food.** *They are then necessarily* **forced to move off** *towards the more fertile regions to the north of them. In this way* **they follow the spring and summer,** *as those seasons advance from the south towards the north, and* **everywhere they find abundance of food** *awaiting them.*

*Some have an appetite for the* **sprouting flower-buds**; *some prefer the* **juicy grubs and worms** *that now make their appearance; some* **catch insects on the wing**; *and some again look out for the* **ripening fruits.**

*Then as summer wanes and* **these things begin to get scarce,** *they set their faces south, and* **start off for their old homes** *once more.* They are **summer visitors.**

During the severity and scarcity of our winter they find those southern regions "a land flowing with milk and honey." **Insects swarm** everywhere, the strands and mudflats teem with living things, the air, the water, and the vegetation alike **abound with food.**[1]

They spend a roving life during this period, **no longer**

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[1] This is the view held by Dr. Wallace (see *Geographical Distribution of Animals*, vol. i. p. 21), and it is the generally accepted theory of migration. Professor Charles Dixon, in his *Migration of Birds*, 1897, propounds a new theory, in which he says that food and temperature are only a secondary cause of migration. He says the primary one is the natural instinct of mating, love-making, and breeding, and the rest is only an accident. However, for our purposes it has been thought best, even at the risk of giving offence to the critical, to adhere to the popular theory rather than enter into those details with children.

**living in pairs,** with the care of bringing up a young family, but **flocking together in great numbers.** Spring returns in those parts, however, about the middle of February, and with it the breeding season. Food becomes scarce once more, and once more they take flight back to their old haunts, where they arrive **punctual almost to a day.** Each one then **selects his mate,** and together they set about the business of family life.

*Turn next to consider the* **winter visitors.** *Tell that these birds belong to lands* **far away in the north.** *They live and* **breed there during the spring and summer.** *But as the winter approaches they are* **driven south by cold, hunger, and darkness** *to our more genial shores. Our winter may be hard, but it is* **mild compared with the rigour of the one they leave behind.** *With the return of the spring, however, their natural instinct urges them back to their northern home* **for the breeding season.**

## III. BIRDS THAT COME FOR THE SUMMER

*The children already know that the cuckoo and the swallow are summer visitors. Lead them to tell what they know of these birds, and then proceed to mention a few others. It would of course be impossible to do more than that.*

THE NIGHTINGALE.—*Let the children point out this bird. They will recognise it, no doubt, from their former lesson. Tell that this bird*—**the sweetest songster of our English woods**—*is, after all,* **only a visitor. It comes** to us about the **middle of April,** and **leaves in August,** when the young birds are fit to fly.

*Elicit that it is almost entirely* **an insect eater,** *and that it finds abundance of food during its stay here.*

THE WARBLERS.—*These charming little songsters are so common everywhere, that they must be (many of them at least) quite familiar to most country children.*

There is a large family of them. They are all plain-looking little birds, but they are gifted with a peculiarly **sweet chirping song.** They all **feed on insect food.**

Among the best known members of the family are the **garden warbler,** the **black-cap warbler,** the **reed warbler,** the **grasshopper warbler,** and the **sedge warbler.**

The black-cap warbler, next to the nightingale, has the sweetest and richest note of all our song birds. These birds are all **insect eaters.** They **come in April** and **leave in September,** when the insects begin to get scarce.

**The Wheatear and the Chats,** small birds about the size of the robin, are also **insect eaters** in the main. They **come** to us in **March or April,** and **leave us** about **August or September.** They have a very sweet song.

THE GOATSUCKER.—*Show this bird in the picture. Explain the old superstition that gave the bird its bad name. Tell its other name*—**night-jar.**

*Call attention to* **its wide-gaping mouth.** *Explain that this bird also feeds on insects, but* **it catches the insects on the wing.** *It always flies with this wide mouth open, to snap up all the insects that come in its way.*

*Tell that it seems to come here in search of one special insect* —**the cockchafer**—*for it does not arrive till* **May or June,** *when those insects begin to make their appearance; and when in* **September** *it takes its departure, it must have devoured almost the last one, for* **very few of the insects are to be seen after that.**

The goatsucker is a **beautifully-marked bird** about ten inches long. It makes no nest, but lays its **two mottled eggs on the ground** under the shelter of a tuft of grass, ferns, or bramble.

**The Great Plover,** or **thick knee,** is a large wading bird, about seventeen inches in length. It is also known as the **stone curlew** and the **Norfolk plover.**

Its plumage is **mottled black and brown above,** and **white on the under parts.**

It **arrives in April,** and **departs in October,** and feeds upon **slugs, worms,** and **insects.**

Like the goatsucker, it makes no nest, but lays its two eggs on the bare ground.

### IV. BIRDS THAT COME FOR THE WINTER

*Remind the children that, just as some birds come from the south to spend the summer with us, so* **a few come from the frozen north,** *to live with us through the winter,* **because our winter is less severe than their own.** *We will name one or two of these.*

These birds mostly **flock together in great numbers,** but they **do not live in pairs,** and they **do not nest** in our country. They return to their other homes in the spring for nesting.

THE FIELDFARE. — *Point out this bird in the picture. Notice that it is very much like a thrush. Tell that* **it is really a very large thrush**—*it is about twelve inches in length.*

This bird **arrives here in November,** and **stays till March,** feeding on the berries and other wild fruits which it finds in the hedges and woods.

THE WOODCOCK. — *Point out this bird, calling special attention to its* **long bill.** *Tell that* **it lives on worms,** *which it catches by forcing that long bill deep into the soft mud of the marshes where it lives.*

This bird **comes in October** and **lives here till March or April,** when it flies off to its other home in the far north **for the nesting season.**

It is a night bird. It is rarely seen during the day; it comes out at night to feed. The **Jack snipe,** the **common snipe,** the **curlew,** and the **lapwing** are all similar to the woodcock in their habits. They are all winter visitors.

**The Snow Bunting,** another winter visitor, is a small bird about the size of a lark. It is also known as the **Lapland bunting,** the **white lark,** and the **pied finch. It comes** to our country **in October,** and stays with us till **March.** In winter the whole of its plumage except the back is pure white.

**The Brambling,** a little bird of the finch family, is another of our winter visitors. It feeds mostly on beechmast.

### SUMMARY OF THE LESSON

1. Many birds set out to find new homes as the nesting season returns each year.

2. During this time they live in pairs and bring up their young ones. They find abundance of food for themselves and their nestlings in these new homes, but they would most likely starve in the lands they have left behind.

3. By the time the nesting season is over and the young ones are able to fly, food is getting scarce, and they return to those lands where they again find abundance of food till the next nesting season comes round.

4. The swallow and the cuckoo, the warblers, the nightingale, the wheatear and the chats, the goatsucker and the great plover are summer visitors.

5. The fieldfare, woodcock, snipe, the snow bunting, and the brambling are all winter visitors.

## Lesson XXIX

## THE CUCKOO AND THE SWALLOW

The teacher should be provided with Brown's picture of these birds.

### I. INTRODUCTION

*REMIND the children that in our last lesson we talked about a few of the birds that come to stay with us for part of the year, and then leave us to go away to their other home.*

*We purposely said very little then, about two of those birds*

*—the cuckoo and the swallow—not because we meant to leave them out, but because they were to have a lesson all to themselves.*

We will now see what there is to learn about them.

## II. THE CUCKOO

1. *Elicit from the class all they can tell of this bird from their former lessons :—*

It is named from its cry, which sounds like **cuck-oo, cuck-oo.** We often hear the cry, but **seldom see the bird itself,** for it is a very shy bird.

It comes to us **about the middle of April,** and stays here till **August.** When it leaves us **it flies away to the warm lands of the south,** so that it never knows what cold weather is.

2. *They will be sure to remember the unnatural habits of this bird, in never building a nest for itself or rearing its own young ones.*

The eggs are laid, one here and one there, **in the nests of other birds,** such as the **hedge-sparrow,** the **meadow-pipit,** and the **wagtail.**

*Tell that these birds hatch the strange egg with their own, and that in return for this the young cuckoo, when it is big enough, pushes all the other little ones out of the nest.*

3. *Turn to the picture now, and show and describe the bird as follows :—*

It is a large bird **about fourteen inches long**; it is not unlike the sparrow-hawk in shape

*Notice that, like the woodpecker, it has* **two toes in front** *and* **two behind.**

It is a **climbing bird.**

Its plumage is **bluish-grey above,** with **the under parts white,** and the **throat and breast** are **buff-colour, crossed with black bars.**

It does not seem to be a weak bird. It looks quite as able to stand the winter weather as any other.

Why should it go away, and stay away, till winter is over?

4. *Remind the children that the cuckoo* **feeds on insects** *—it is particularly fond of caterpillars. They of course will readily tell the rest—***this bird goes away because there would be no food for it here in the winter.** *As soon as spring returns, and with it the insects, the cuckoo comes back.*

## III. THE SWALLOWS

1. *The children already know from their earlier lessons that these birds too are* **summer visitors.** They come about **the second week in April**; they leave in **the middle of September.**

*Elicit all that can be told of the habits of the birds :—*

They are **always on the wing**; they dart very rapidly through the air; towards dusk they may be seen skimming over the ponds and streams; they are **seldom or never seen on the ground or on a tree.**

2. *Explain that these birds also* **feed on insects,** *but, like the goatsucker, they* **catch the insects on the wing.** *They too have* **wide-gaping mouths,** *and they always fly with the mouth wide open, to snap up all the insects that come in their way.*

*Picture the swarms of gnats which are to be seen hovering over a pond or a pool on a summer evening. Hence these are favourite spots for the swallow.* This bird devours thousands of insects in a single day.

*Show from this the necessity for rapid flight, and the reason why such birds are seldom or never seen on the ground or among the trees.* **Their food is in the air; they are made for flight.**

*Their wings are long and powerful, but the legs are weak.*

3. *Turn to the picture now, and ask the children to find the swallow. This will most likely puzzle them at first, for although*

*they are fairly familiar with the bird on the wing, they see in the picture four birds, all of the swallow kind, and they do not know which to name.*

*Tell that the swallow family consists of* **the true swallows, the swifts,** *and* **the martins,** *and proceed to describe each as follows :—*

THE TRUE SWALLOWS.—*Show the bird in the picture, calling particular attention to the* **long feathers on the edges of the tail.** *Tell that these feathers are best seen when the bird is on the wing ; they are ⅔ the length of the bird. Compare with the tails of the other members of the family. They have no such feathers.* **This then is the distinctive mark of the true swallows.**

*Notice next the beautifully-marked plumage of this bird.* The **head** is **chestnut-brown,** the **wings and back** are **steel-blue,** the **edge feathers of the wings** (primaries and secondaries), as well as the **tail feathers,** are **black,** and **all the under parts are white.**

*Tell that these birds build their nests* **under the eaves of houses,** *and* **inside chimneys.**

They are sometimes known by the name of **chimney swallow.**

The nest is **built of mud or clay,** which is brought by the birds from the banks of the ponds and streams, and stuck one lump upon another to form a sort of basin.

*Ask the children to watch the birds during their building operations. It is very curious to notice how cleverly* **they run up the perpendicular wall,** *and* **cling with their feet and tail** *while they are at work. Explain that the* **feet are specially formed for this.** *The toes have sharp claws for clinging, and the* **hind one can be turned forward at will.**

This mud nest they line with grass to receive the eggs, and they often **rear two broods in one year.**

THE SWIFTS.—*Ask the children to watch the swallows on the wing. Tell that* some of the birds **do not flap their wings** while flying; they seem to **shoot through the air like a dart.** These are **swifts,** and **not true swallows.**

*Show the bird in the picture.* It is about the same size as the true swallow—a little over seven inches in length; but it is **not so beautifully marked,** for the back, wings, and all **the upper parts** are sober **black,** and the **under parts grey.**

*Tell that this bird is the last of the family to arrive, and it usually leaves us about the end of August. It therefore* **pays us a shorter visit** *than any of the others.*

**The nest is a rude, rough structure** of straw, hay, and feathers, and is generally placed **in a hole under the thatch or tiles** of a house. It lays from **two to five white eggs.**

THE SAND-MARTIN.—The martins are smaller birds; they are only about **five inches long.**

*Show the picture of the sand-martin. Tell that it is so called, because* **it tunnels** *with beak and claws* **into the soft sandstone of the hill-side** *to make its nest.*

*It sometimes tunnels in this way four or five feet deep, but the nest which it makes at the end of the tunnel is nothing but a little heap of moss, hay, and feathers.*

*In this heap, which can scarcely be called a nest, it lays from* **four to six very small pinkish-grey eggs.**

THE HOUSE-MARTIN.—*Point out this bird in the picture.* It is more like the true swallow than any of the others, except that it is much smaller, and **it has a large white patch at the end of the upper tail coverts.** *Point these out.*

The **upper parts** of the body are a **rich blue-black,** and **the under parts white.**

*Tell that, like the true swallow, it makes its* **nest of clay or mud**; *but it always builds either* **under the eaves** *or* **in the windows** *of the house.*

### SUMMARY OF THE LESSON

1. The cuckoo comes about the middle of April, and leaves about the middle of August.
2. It is an insect eater. There are no insects here in the winter, but they are abundant in the warm lands of the south to which this bird returns.
3. Swallows are insect eaters. They catch their prey on the wing. They have wide-gaping mouths.
4. There are several families of the swallow — the true swallows, the swifts, and the martins.

## Lesson XXX

## SUMMER (A RAMBLE)

Brown's picture of Summer will be required for recapitulation work in the school-room.

### TIME—EARLY PART OF JULY

### I. LONG DAYS AND SHORT NIGHTS

*The best time for the ramble would be in the afternoon, when the sun is not too fierce.*

*On setting out commence by leading the children to chat about the length of the day, comparing it of course with the days in mid-winter and spring. Elicit that ever since then till now the days have been growing longer.*

*Remind the children that to them it must seem to be always daylight now.* It is daylight long before they get up in the morning, and it is daylight when their bed-time comes round.

*Explain that at this time of the year* the sun rises **between three and four o'clock in the morning,** and it does not set till **after eight o'clock in the evening.** This gives a very long day, and so of course the night must be very short.

*Tell that the days will not lengthen any more now.* **We are now in the height of summer**—*the days are at their longest.*

## II. NATURE'S NOON-TIDE

1. *Call the attention of the children to the kind of clothing they wear now, comparing it with their thick winter clothing.*

We now wear **the thinnest and lightest clothes** we can get, and these are often too much for us, as the weather is so hot.

*Stand still for a while to* **notice the sheep** *in the fields.* They look comfortable now, but how would they feel on a hot day like this, if they were still covered up in those thick fleeces, which they wore when we saw them in the early spring?

2. *Let the children tell what they can of the* **sheep-shearing time** *at the farm.*

It has done the sheep good to get rid of those thick coats of wool. Like ourselves **they could not bear great-coats in this hot weather.**

*Remind them that the farmer* **has his horses clipped** *before the hot summer weather comes.* **They do not want a thick coat now any more than the sheep.**

3. *Refer to the early lessons on the sun. Lead the children to tell that at noon the sun reaches its highest point in the sky, and that now* **the noon-day sun is much higher in the sky** *than it is in the winter. They know how to show this by measuring their shadows on the ground.* **Noon is the hottest part of the day.**

Where do we find the cattle and sheep in the fields during the very hot part of the day? They like to get under the trees, **because the thick clusters of leaves make a cool shade there.**

4. *Point out that as we called winter* **Nature's Night,** *and spring* **Nature's Morning,** *so now we must look upon summer as* **Nature's Noon.** Everything in Nature is now at its **fulness and perfection.**

## III. NATURE'S GIFTS

1. *Continue the walk now, calling attention in a casual way to the hay in the meadows, and the waving ears of corn in the fields. Both may be passed by in this way now, as they and the rest of the farmer's crops will be more fully dealt with later on.* **These are some of Nature's best gifts to man.**

2. *It would be well, by way of recapitulation of old work, to notice the orchards on the way, and to call upon the children to describe the various kinds of fruits one by one, assisting them of course where necessary.* **These delicious fruits are another of Nature's bountiful gifts.**

3. *With the same object of recapitulating old work, the teacher should next direct attention to the trees, plucking a leaf here and there in passing, and calling upon the children to name it, and at the same time to note the characteristics of the tree whence it came.*

*If the advice given in the earlier lesson has been faithfully followed, the children, by pressing out the leaves, and drawing them from time to time, will now be familiar with most of them.*

4. *Pass on next to consider the trees themselves.* They are **the grandest and noblest of all Nature's plant products.** They are **lovely in the fresh early spring,** when they are putting forth their tender buds. They are deeply beautiful now in the height of summer, with

**their cool and delicious shade,** and **the hum of many insects** among their rustling leaves. By and by **when autumn comes** and **tints the leaves with its bright hues,** they become if possible more lovely still, and even winter, with all its terrors of frost and snow, fails to rob them of their grandeur. Think what a world without trees would be like.

5. But besides giving beauty to the landscape, trees are of immense service to man.

*Lead the children to think of only a few of the purposes to which timber is put. The farm implements, our houses and furniture, machinery of all kinds, and the ships that sail the seas—all owe their very existence to the trees.* **Trees are another of Nature's bountiful gifts to man.**

## IV. SUMMER WILD FLOWERS

1. *The children have by this time learned just enough about the flowers to make them eager to learn more. It would be well, therefore, to let them disperse now in the lanes and meadows, and about the margin of the coppice, in order to gather bunches of wild flowers for themselves.*

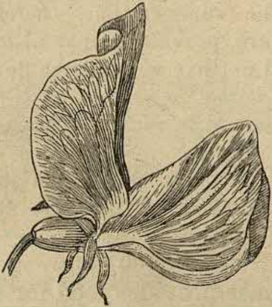
*Indeed, the ramble would not be complete without calling attention to the wealth of wild flowers which meets us now at every turn.* **These are another of Nature's gifts at this bountiful season of the year.**

2. *Give the children a stated time, and on their return gather them together under the shade of some tree, and proceed to examine their collection. Needless to say, this should be done without any attempt at classification, and only with the view of teaching the children to observe for themselves, so that they may learn to compare the new flowers one with another, and with those which are already familiar to them.*

3. *In dissecting the flowers for inspection, it would be advisable to gum each part on a sheet of paper, which may then be handed about without fear of the wind.*

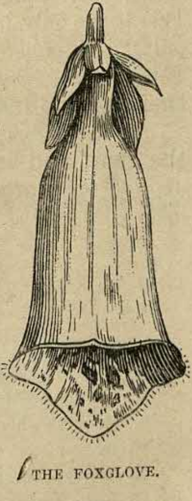
*The teacher, while doing this, would naturally call attention to a few of the curiously-shaped flowers, such as* **the lipped flowers of the dead-nettle,** *the* **butterfly flowers of the pea family,** *the very* **peculiar flower of the orchis,** *and the* **beautiful curved drooping bell of the foxglove.**

THE DEAD-NETTLE.


THE PEA-BLOSSOM.

*This should be done without going into details now, but it will pave the way for further teaching by and by.*

THE SPOTTED ORCHIS.


THE FOXGLOVE.

### V. Insects and Birds everywhere

*Notice that on all sides* **the birds are singing and twittering** *in the trees, and that* **the air is full of the hum of insects.**

A Fine Time for Insects.—*Remind the children that* *the bees and many other insects, such as butterflies and moths, depend upon the sweet juices of the flowers for their food.*

The summer-time, therefore, **with its wealth of flowers**, provides plenty of food for these insects. They could not live without the flowers.

*Tell that, besides the insects which suck the juices of flowers, there are some, such as* **wasps,** *which* **live mostly on the ripe fruits**; *some, such as* **beetles** *and* **caterpillars,** *which* **feed on the green leaves**; *and some again which* **eat their way into the stems of the plants.** The oak-tree alone is said to provide food during the season for at least 2000 different varieties of insects. **The summer provides food for all.**

A Fine Time for Birds.—*Lead the children to think of the swallow, the cuckoo, and the rest of the birds which feed entirely on insects.*

*There is* **plenty of food for these birds now.**

The caterpillar is the favourite food of the cuckoo. This is the only bird that will eat the great hairy caterpillar. Summer must be a fine time for these birds. They leave us before the cold weather comes, **for then there are no insects.**

*Tell that many of the birds like to vary their insect diet with* **the fruit and seeds of plants**; *and others again have an appetite for* **worms, slugs,** *and* **snails** *which they find in and on the ground.* **Summer is a good time for them.**

## SUMMARY OF THE LESSON

1. Summer is Nature's noon-tide. It is the time when everything is at its fulness and perfection.
2. Nature scatters her bountiful gifts of flowers and fruits.
3. Insects swarm everywhere, because there is plenty of food for them.
4. Insects, worms, slugs, and snails provide abundance of food for the birds.

# INFORMATION FOR THE TEACHER

## List of Summer Wild Flowers

*It would be impossible within these limits to do more than mention a few of the flowers, and of course these may not all be found in the same locality. The teacher must select for himself one or two from each of the following groups, all of which are in bloom in their own localities at this time of the year, and may be found :—*

### By the Wayside, and on Banks and Hedgerows—

**The Dog-rose.**—The calyx consists of 5 distinct sepals ; 5 fragrant pink petals form the corolla ; the stamens are very numerous ; the fruit or seed-vessel is a "hip." *Compare with the buttercup.*

**The Sweet Briar.**—The calyx is a tube formed of 5 sepals ; the corolla consists of 5 fragrant pink petals ; the stamens are very numerous ; the seed-vessel is small and pear-shaped.

**The Bramble.**—The calyx has 5 separate sepals ; the corolla consists of 5 lilac-pink crumpled petals ; the stamens are numerous ; and the fruit or seed-vessel is the blackberry.

**The Common Mallow.**—The calyx is formed of 5 distinct sepals ; 5 purplish-red petals form the corolla ; stamens and pistils are both numerous. Flowers grow in clusters.

**The Forget-me-not.**—The calyx has 5 deeply-cleft sepals ; the corolla 5 petals, bright blue with yellow centre ; stamens, 5 ; seed-vessel a tiny nut with 4 divisions or cells.

**The Bindweed** (Convolvulus).—The calyx, 5 sepals ; the corolla, 5 white or pink petals, joined at their edges to form a large open bell ; 5 stamens ; seed-vessel, a capsule with 2 cells.

**The Campion** (two varieties—pink scentless, white fragrant in the evening).—The calyx has 5 sepals ; the corolla 5 deeply-cleft petals ; there are 10 stamens ; the seed-vessel is a capsule.

**The Dead-Nettle** (red and white).—The calyx of 5 sepals forms a long tube ; the corolla forms two lips ; upper lip long and arched ; the flowers are great favourites with the bees ; unlike the common nettle, these do not sting.

**The Harebell.**—The calyx has 5 separate sepals ; the corolla, 5 broad-lobed petals forming a pale-blue bell ; stamens, 5.

### In the Meadows and Cornfields—

**The Scarlet Poppy.**—The bright red flower of the cornfields. Its calyx consists of 2 sepals, which fall as the flower opens ;

the corolla is formed of 4 delicate crumpled petals; the stamens are numerous; the seed-vessel is a large capsule full of seeds.

**The Buttercup.**—There are two varieties of this well-known meadow flower, which are always found growing side by side. One is the upright buttercup, the other the creeping buttercup, so called because it grows by sending out runners which take root and spring up again. Both are alike in every other point. They have 5 sepals and 5 petals, all separate: there is a cluster of many stamens; the seed-vessel is a sort of nut.

**The Ox-eye Daisy.**—Large head of tiny flowers or florets on the same stalk; disc florets yellow; ray florets white. *Compare with common field daisy.*

**The Spotted Orchis.**—The whole of the flower-leaves alike in character form a perianth; the flower is irregular in shape, and consists of 6 parts; the lip has 3 lobes, and is spotted with purple spots inside.

**The Heart's-ease** (Pansy).—The calyx has 5 sepals; the corolla 5 petals (the lower one forming a spur). *Compare with the violet.*

## In the Woods and Copses—

**The Honeysuckle or Woodbine.**—These lovely fragrant flowers grow in large bunches, all springing from the same point at the end of a twig. They vary in colour, some being pink, others yellow, and others again white. The calyx has 5 sepals joined at their edges to form a sort of cup; the corolla is a long tube with limb 5 cleft and irregular in form; stamens, 5; fruit a red berry, growing in clusters.

**The Tuberous Pea.**—The calyx has 5 sepals joined at their edges to form a cup; the corolla is irregular, butterfly shaped, purple; stamens, 10; fruit a long pod (legume). *Compare with the pink everlasting pea.*

**The Butterfly Orchis.**—Perianth of 6 white irregular-shaped petals. *Compare with the spotted orchis of the meadows.*

**The Lily of the Valley.**—Perianth 6 cleft segments; white, very fragrant; drooping flowers hang one above another from stalk; stamens, 6; ovary small berry.

**The Foxglove** (Folk's glove = fairies' glove, from shape of corolla). —Calyx, 5 separate petals; corolla all in one piece, forming a sort of drooping bell; stamens, 4.

## Lesson XXXI

## THE FARMER'S CROPS

### I. PLANTS GROWN FOR THEIR LEAVES

1. THE LEAVES AND STEM.—*Take the children to a meadow about the end of June, when the grass is nearly fit to cut. Pick some of the long stems of grass, clover, and wild vetch while walking along, and then gather the class together at the edge of the field to examine and compare them one with another.*

2. *Show the children how to strip* **the leaf-sheath** *from the grass stem. Point out* **the joints** *and* **the ligules,** i.e. *the white, thin outgrowth at the angle made by the blade and its sheath.*

Grass grows in **round jointed stems,** and **at each joint a sheath** commences. This sheath encloses the stem for some distance upwards, and then branches off into **a long, narrow, pointed leaf.**

The whitish growth, where the leaf joins its sheath, we call **a ligule.** It is not the same in all kinds of grass.

3. *Notice that* **the stem is hollow, except at a joint,** *where it is hard and thick.*

*Hold the blade of grass between the eye and the light, and observe* **the thin, straight, parallel lines** which run from end to end of the leaf. These are **the veins.** Grass has **parallel veins.**

4. *Show the clover now, and notice that* it has **an upright stem,** with stalks growing out from the stem. At the end of each stalk there is **a compound leaf,** and **each leaflet is rounded** and **net-veined.**

5. *Examine next the* **wild vetch.** This has **a trailing**

**stem.** It has **a compound leaf,** with **long, narrow, net-veined leaflets,** and at the end of the blade-stalk there is **a curled thread-like tendril,** with which the stem supports itself.

Cattle eat all these leaves. Clover and vetch are often grown together, without grass, as food for cattle, but then the seeds have to be sown like any other crop.

*Both these plants will be dealt with more fully in a later lesson.*

1. THE FLOWERS.—*Let one of the boys walk a little way amongst the grass, and then call attention to his clothes. They are covered with* **a dust-like powder.** *Strike the grass with a stick, and notice* **the cloud of dust that arises.** *Tell that this is* **pollen,** *and remind the children that* **pollen comes only from flowers.**

2. *Show the flower.* You are surprised to hear that grass has flowers, for we have always called this the grass seed. You know, however, that **before the seeds come there must be flowers.** These are the flowers of the grass.

1. WHY GROWN—*Elicit from the children that in a few days the farmer will begin to cut this crop of tall grass, dry it, and store it as hay-food for the winter.*

*Take them next into a pasturage, and let them stand and watch the cattle feeding. Observe that the animals move on slowly, eating the grass as they go, and that* **now and then they will walk on a few steps without eating anything.**

*Refer the children to their own likes and dislikes, and tell that* there are some plants which the cattle do not like. For instance, **they pass by the pretty yellow buttercups** that grow amongst the grass. They never crop these flowers, because of their **bitter burning taste**; but **they like the fresh young tender leaves of grass and clover.**

2. What will be done when they have eaten all the grass in this field? **They will be taken into another field to feed,** while the grass in this one grows again.

So then grass is grown to feed cattle and sheep. These animals **eat the leaves of grass all through the year.**

### II. Plants grown for their Roots

1. Stem, Leaves, and Roots.—*Take the class to a field of* **turnips, swedes,** *and* **mangels** *now. Pull up a plant from each field, and examine and compare them as follows:—*

Each has a **long root.** This is called **a tap-root.** The upper part of this root will grow larger and larger, until it is nearly round like a ball. **Fine thread-like roots grow out from the tap-root.**

2. From the top or crown of the root grow **many thick stalks.** These are **flat where they joined the root,** but become rounded where the leaf starts.

The leaves are **large, deeply notched,** and **net-veined.** The **turnip** has a **rough, hairy green leaf,** and a **whitish root**; the **swede** has a **bluish-green smooth leaf** and a **yellowish root**; and the **mangel** a **reddish-green leaf** and **a yellowish root.**

3. *Notice that these plants grow in long straight rows; the leaves of one row nearly touch those of the row on either side.* The **seed was drilled** into the ground in spring.

*Tell that these plants will not flower this year. If they were left in the ground they would flower next year.*

*Notice how free these fields are from weeds.*

How is this? The soil has been carefully and frequently hoed between the rows. The land where root crops are grown must be kept clean and free from weeds.

1. Why grown.—Why are these root crops grown? The roots are given to cattle and sheep in the winter.

Sometimes the leaves too are eaten. The **turnip and swede** are often **dug up** and **eaten on the ground**; but the **mangel** is always hauled to the farm and **stored for winter use.**

2. What do we learn from these two crops? We learn that grass, clover, and vetch are grown for their leaves, while turnips, swedes, and mangels are grown for their roots. We call them both **fodder crops**, because they form food for cattle and sheep.

### III. PLANTS GROWN FOR THEIR GRAIN

1. CORN A GRASS PLANT.—*Pay the next visit to some fields of wheat, barley, and oats. The teacher should find some couch-grass (in flower if possible) for comparison with the first two; the oat-grass or the cocksfoot from the meadow will represent the third. Pull up a stalk of all three (wheat, barley, and oats), and proceed to examine them.*

2. *The result of the examination will be to show that the* **roots are fibrous,** the **stems jointed,** the **leaves long, narrow, smooth,** and **grass-like,** with **parallel veins,** and a **sheath** which encloses the stalk. The **ligule is hairy,** and goes quite round the stem.

*Let the children compare these corn-plants, point by point, with the grass specimens, and so lead them to discover for themselves that* **all three plants (wheat, barley, and oats) are grasses.**

3. *The florets of these corn-plants being large can readily be shown. Hold a spikelet at the bottom, where the two outer dry leaves join, and press it between the finger and thumb. This will cause the floret to open, so that the parts are brought to view. The children will then be able afterwards, by pulling apart the spikelets of the grasses, to note the similarity.*

The spikelets of wheat and barley have no stalk; the oat spikelets have long stalks.

In what respect do these corn-grasses differ from meadow grass? The seeds for them **must be sown every year.** The farmer ploughs and harrows the land and drills in the seed for each crop.

4. What is that beautiful scarlet flower? It is the **poppy.** There are thousands of them in the field. How pretty they look amongst the green corn.

Why does the farmer grow poppies? He does not grow them; he does not want them. They are **wild flowers**; they spring up of themselves; **they are weeds.**

*Point out that weeds grow everywhere amongst these corn-plants. The land is not so clean as that where the root crops are growing, and the reason for this is that* **the men cannot get among the corn when it is tall, to hoe down the weeds.**

1. WHY GROWN.—This green corn-grass is full grown; it will not grow any more.

Will the farmer cut it down soon as he does the hay? No, he does not want the green corn for food; **he grows it for the seed or grains of corn.** He will let it ripen, and then the leaves and stalks will have **changed from green to yellow.**

The farmer calls these dried stalks of the corn **white straw.** It is not used as cattle food, but only as **bedding,** and then as **manure for the land.**

2. But what will be done with the ripened grain? The **wheat will be ground into flour** for bread; the **barley will be made into malt,** or **ground into meal** for feeding cattle and pigs; and the **oats will be used for feeding the horses.**

In Scotland the people grind oats into oatmeal for oat-cakes, and in some countries they eat barley bread instead of wheaten bread.

## IV. PULSE CROPS

*Walk through a* **field of beans** *and* **peas,** *and again draw attention to the long straight rows of plants. Notice* **the hum of the bees** *among the flowers.*

*Examine the growing plants, and lead the children to tell the distinguishing features of each. Pluck off some leaves and a few flowers from both, and compare them.*

1. THE STEM AND LEAVES.—The bean has a **straight, upright, four-sided stem,** with **broad dark-green leaves.** We call them **compound leaves,** because there are **three leaflets** to each leaf. They are **net-veined and smooth.**

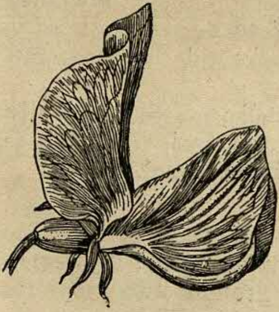
The pea has **a round, weak, straggling stem,** with **compound net-veined leaves,** and at the end of the leaf-stalk there is **a tendril** like that of the vetch, by which the stem supports itself.

2. THE FLOWERS.—Look at this flower. It is something like a butterfly in shape. We call it **a butterfly flower.**

*Dissect one from each plant, and name the various parts.*

This upright petal we call the **standard**; these two side ones are **the wings**; and the two joined together are called **the keel.**

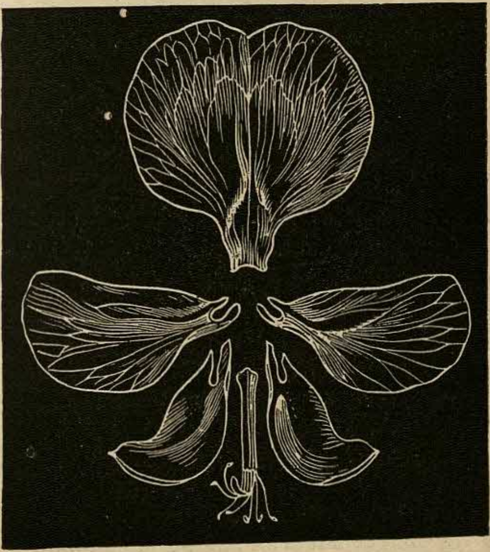
What is this long curved green thing in the centre? This is **the ovary.** We call it **a pod.** In it **the seeds—peas and beans**—will grow.



**The bean and the pea are very much alike.** They are, in fact, the same kind of plant.

3. WHY GROWN.—What does the farmer grow this crop for? He wants the seeds inside the pods. Sometimes he uses the stalks for bedding for animals. He calls the stalks of beans **black straw.**

Beans form the chief food for horses. Peas are either eaten whole or ground into pea-meal for sheep, pigs, and cattle. Sometimes the farmer gives the green stalks of peas to the cattle to eat. What will the seeds be like when they are ripe? They will be hard and dry.



## SUMMARY OF THE LESSON

1. Grass, clover, and vetch are meadow crops. They are grown for their leaves.

2. Turnips, swedes, and mangels are root crops. Their large fleshy roots are used for feeding the cattle and sheep.

3. All kinds of corn are grasses. They are grown, not for their leaves, like the common grass, but for their seed or grain.

4. The dried corn-stalks provide the farmer with white straw, to be used for bedding and then as manure.

5. Peas and beans are pulse crops. They are grown for their seeds. The stalks are called black straw.

## Lesson XXXII

## THE COTTAGE GARDEN (FIRST LESSON)

### I. GENERAL ARRANGEMENT

1. *Take the children to a good-sized, well-kept garden in the early part of July. As they walk through the garden call attention to its arrangement. Get the children to find out its position, and show which is the sunny and which the shady part.*

*Notice that the plants in one part are not the same as those in the other. The children already know that plants require sunlight and heat. They now learn* **that some plants require more sun than others.**

The gardener knows which plants want most heat, and of course **he places them in the sunniest part.**

2. *Lead the children in the next place to observe that each kind of plant is in a bed by itself.* **The plants are not mixed up together.**

*Notice too that some plants are* **growing in rows**; *some are* **scattered about** *in the beds; some have* **sticks to support them**; *others are able to* **support themselves** *without sticks.*

The garden is very **fresh and green, prim and tidy.**

*Refer to the poppies growing among the corn, and compare with the clean, tidy appearance of the turnip ground.*

There are **hardly any weeds** in the garden. The owner is constantly on the look-out for weeds; he pulls them up as fast as they grow.

3. Look; here is one which he has missed though. I know it by its leaf. It is a **dandelion**; if we let it grow it would bear **flowers something like the common field daisy.** But then after the flower, you know, come the seeds. This weed produces an immense number of seeds from one flower; **the ripened seeds would be blown about by the wind,** to spring up by-and-by into young plants; and so in a short time the garden would be overrun with these weeds.

4. *Cut up the dandelion carefully with a knife to show the* **great length of its tap-root.**

*Tell that weeds like this* not only **take up valuable room** in the garden, but **rob the** gardener's **plants of the food** which they ought to get from the soil. At the same time they are much stronger than the garden plants, **they grow much more rapidly**; and before long they would crowd round the plants, **rob them of sunlight and air,** and so cause them to become **pale, weak, and sickly-looking.**

The gardener cannot afford to grow weeds in his garden.

5. Here is a row of plants with some white powder on the soil around each stem.

What is that for? This white powder is **lime**; it is put there **to kill slugs and snails** and other vermin, that would otherwise eat the young plants.

*Tell that a mixture of* **soot and salt** *is often used for the same purpose.*

**Slugs and snails,** like weeds, are the gardener's **worst enemies.**

We will now turn our attention to the different kinds of plants in the garden.

## II. PODDED PLANTS

1. *Question briefly as to the farmer's crops, eliciting that some plants are grown for their leaves, some for their roots, and some for their seeds, and proceed :—*

Let us see now whether this is so in the garden. Ah! here are some old friends of ours. What are they? They are rows of **peas and beans.**

*Observe that we can tell the pea by its* **round straggling stem** *and* **clinging tendrils.** *Sticks are put near the plant, so that these* **tendrils may cling to them** *and support the stem.*

These stems are too weak to support themselves. We call them **climbing stems.**

2. *Notice that these plants are much taller than the peas we saw in the farmer's fields. They cling to the sticks and* **mount higher and higher** *towards the light and air.*

*Call attention to the* **butterfly flower,** *and let the children point out its different parts.*

*Notice also the* **pea-pods**—*the fruit which comes after the flower.*

The beans, too, seem larger and the plant taller than those in the field. The plants are all **covered with blossoms and pods.**

3. Which part of these plants do we eat? We eat the **young, green, tender seeds** in the pods. They are not left to ripen like those in the field.

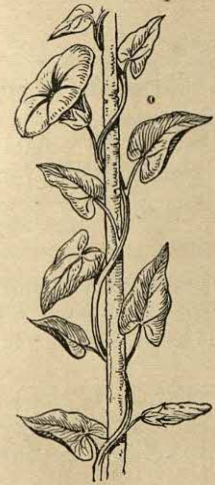
Can you show me another plant with a pod?

*The children will at once point out the* **kidney bean.** *Compare it with the* **broad or Windsor bean.** *Point out that this plant, like the pea, has a* **round, weak, slender stem,** *which could not support itself. It* **twines round a stick** *for support.* We call this a **twining stem.**

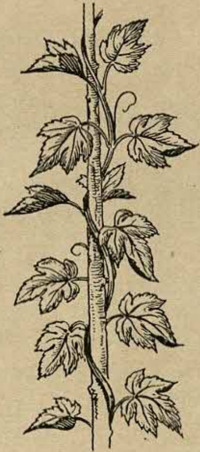
4. *It would be interesting to compare it with other twining*

*stems, such as those of the* **hop** *and the* **convolvulus** *(bindweed), both of which will probably be found in the flower-garden.*

The **kidney bean** and **the bindweed** twine round their support **from left to right,** that is, in the direction of the sun; but the **hop** always takes the other[1] course, **from right to left.** Each is obeying the law which Nature has set for it. **They never change their direction** by any chance.



BINDWEED.



HOP.

*Unwind each stem, and force it the other way round the stick, and let the children observe how it resumes its old direction again,* **holding the stick with one of its leaf-stalks to get a purchase for the change.**

5. *Call attention now to the* **red butterfly flower,** *and the*

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[1] The black briony, another common twining plant, twines in the same direction as the hop, from right to left.

**compound leaf** (*three leaflets*) *of the kidney bean.* The plant differs in many respects from the Windsor bean.

What will come from the flower? **A pod,** which, with the young beans inside, will be eaten. It will be cut into strips and boiled.

There will be plenty of pods on these plants, because they are so full of flowers.

6. *Now combine all the features of these plants, thus:—*

All have **butterfly flowers,** and bear **seeds in pods.** One has a stout **upright four-sided stem,** another a **rounded straggling stem with tendrils** for climbing, and another again a **slender stem which twines** round a support of some kind. Each plant bears many flowers and therefore many pods.

7. When are the seeds set? They are set in spring. The plants soon grow; they flower and bear fruit in the summer; and in the autumn they die away. Such plants are called **Annuals.**

**The seeds must be set every year.** The gardener therefore always leaves some of the pods to hang till they ripen, in order that he may have seeds to set in the next spring.

## III. Leaf Plants

*The seed-bed will be found most probably at one end of the garden. Take the children to it, and show them the young strong cabbage, cauliflower, or broccoli plants. Some may have been transplanted; if so, show these also. The children will tell what they are. Pull up one of the cabbage plants for examination.*

1. These are young cabbage plants. The young plant has **one thick root,** and **a number of hair-like roots.** This we call a **tap-root.**

What have you seen father do with a root like this before he plants it? He breaks it off short. Then more hair-like roots spring out from it, and so the plant is able to get plenty of food, when it is transplanted, or put into another bed.

2. *Elicit that we eat the leaves of this plant. They grow very large, and lie folded up together very close,* **almost like a ball.** *The inner leaves will be* **quite white**; *the outer ones green.* Why?

*The inner part of the cabbage is called* **the heart.** *The leaves are* **very smooth** *and crinkled.*

3. *Call attention to the other seedling plants now, and compare them one with another.*

These plants are all members of one family—**the cabbage family.** It includes several **varieties of cabbage**: the **Brussels sprouts plant,** in which tiny round cabbages grow out all round the stem; the **curly kale,** a curious kind of cabbage, which consists of heads of curly, wrinkled leaves, sometimes green, sometimes purple; the well-known **cauliflower** and **broccoli**; and the **sprouting broccoli,** so called because instead of sending up one great head of flower, it sprouts out into many shoots and heads from all the joints in the stem.

4. How did these plants grow here? They came **from seeds** which were set.

Where did the seeds come from? They came **from a flower.**

Which of you have seen a cabbage flower? Only one boy. *Father left a cabbage in the garden through the winter, and next summer it flowered. The heart opened, a very tall stem grew out from it, and at the top of this stem* **a cluster of tiny yellow flowers** *grew.*

5. The cabbage family of plants are all set as a seed one year, and **flower the next.**

How then do these plants differ from the pea and the bean? They **do not die in the winter.**

When are the plants ready to be cut? In the autumn and winter; but some are left till the spring. We eat the **very young flower of the broccoli and cauliflower**; and the young leaves are boiled with the flower.

6. Do you know any other plants whose leaves we eat? The **lettuce** and the young **onion.**

*Point out how the lettuce resembles a small cabbage, and let the children tell that* the leaves of this plant are not boiled. They are washed and eaten raw as they are. These plants quickly run to seed, and **die the same year.**

*Pull up an onion, and let the children examine it. They remember from their earlier lesson that this is not the root of the plant. Let them show the real roots.*

*Pull away carefully leaf after leaf, in order to show that* **the bulb** (*the part which is eaten*) *is really* **a stem from which the leaves grow.**

The onion has a **fibrous root,** and **long, green, rounded, hollow leaves** with **parallel veins.** The leaves are very **smooth** and **shiny,** and taper to a fine point.

7. *Show that the rounded hollow part is formed by the leaf curling, so that the edges meet and join, and that in the stem the curl goes all round the bulb.*

The part which is eaten is really **a thick white stem.** It is called **a bulbous stem,** and is formed by the thick white bottoms of the leaves enclosing each other. It has **a strong smell and flavour.** As the bulb increases in size the long leaves bend down, **lie on the ground, and wither.**

8. *There will probably be, in some corner of the garden, a few of last year's onions left for seed. If so, take the children to see them. Call attention to the tall round stalk, which rises from the middle of the bulb. It looks like a drumstick with that big round ball at the top of it.*

What is this ball? It is a mass of flowers—the flowers of the onion plant. The seeds come from these flowers.

The onion would die if left in the ground during the winter frosts. But the gardener often puts a few into the ground in the spring, and then each one sends up its **long stem with its ball of flowers at the top.** The ball when ripe is picked in the autumn, and this gives him plenty of seed to sow next spring.

*Remind the children of the onions that were grown in the bottles of water.*

Why did the bulbs look shrivelled as the leaves grew? Because **the onion contains a store of food,** which the new leaves sucked up little by little as they grew.

*Notice the shrivelled state of these bulbs now, and compare.*

Plants which do not flower till the second year are called Biennials. *Explain the meaning of the name—Bi = two.*

### SUMMARY OF THE LESSON

1. Weeds and vermin are the gardener's worst enemies.

2. Podded plants have butterfly flowers. They flower and bear fruit in the one year. They are Annuals.

3. The cabbage family and the onion do not flower till the second year. They are Biennials.

4. The lettuce, although like a cabbage in some respects, quickly runs to seed. It lives only one year.

## Lesson XXXIII

# THE COTTAGE GARDEN (SECOND LESSON)

### I. ROOT PLANTS

1. *LEAD the children to a bed of carrots and parsnips. Draw attention to the feather-like leaves of the carrot plant, and the deeply notched ones of the parsnip. Pull up a plant of each and compare.*

Both are tap-roots; one is **white,** the other **red.** The leaves grow **from the crown** at the top of the root, just as they do in the **turnip** and **mangel.** Instead of growing round like a ball, as they do, however, these tap-roots grow larger and thicker **in the form of a cone.** We eat these roots generally in the winter.

2. These plants have big roots, and leaves growing up from them; but do they bear flowers? You cannot say; you have never seen the flowers.

Well, I will tell you. Like other plants, the **carrot and parsnip** also **bear flowers.**

They are like those of the turnip. If the root were left in the ground all the winter, **the flower would come out during the next spring and summer,** and then the seed would ripen and be ready to gather in the autumn.

3. When does father dig up the parsnips? Often in the winter, when the ground is frozen hard.

What has become of all the green leaves by that time? The leaves and green stalks die down to the ground in winter: **only the root remains alive in the ground.**

*Point out that these roots, like many other things in Nature, are then* **taking their winter sleep.** *We know they are not dead, although all the rest of the plant has died down to the ground, for if they were left there till the next spring,* **new leaves would sprout up** *from the crown of the root.*

4. *Remind the children of the carrot-tops that were grown in saucers of water.*

What do you remember about the carrot-tops themselves, as the new leaves grew larger and larger? They **shrivelled up,** and **became quite soft.**

Why was that? Because the new leaves wanted food to make them grow.

They **drew all their food from the carrot-tops,** and so caused them to waste away.

*Tell that, in like manner, the carrots and parsnips, if left in the ground, would wake up after their long winter sleep, and* *new leaves would sprout up and grow from them; but they would* **grow on the food stored up in these roots** *themselves, which would little by little* **waste and wither away.**

These plants with big fleshy roots are like the cabbage. They would **live for two years.** In both cases the tap-root provides food for the new leaves, and the **flowers and seeds do not come till the second year.** We eat the leaves of one plant, and the roots of the other.

## II. THE POTATO

1. Do you know any other plants besides the turnip, parsnip, and carrot, whose roots we eat.

*Some boys of course will name the potato. Do not attempt to set them right for the present, but let the answer pave the way for considering this, the main garden crop.*

*Call attention to the fact that up to this time we have spoken only of the plants in small beds. A very large part of the garden is planted with potatoes.*

Why is this? Because **we eat potatoes all through the year,** day by day. The owner of this garden will want **a large quantity of potatoes.** That is the reason why he has planted rows upon rows of these plants.

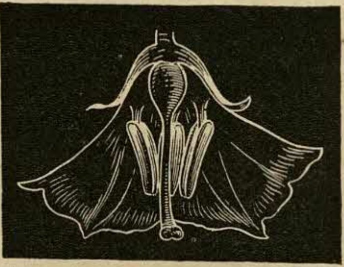
2. *Proceed now to examine the plants.*

Each plant has **tall, stout green stems,** bearing **dark-green compound leaves.** Here is a potato flower, and here is a potato ball. In this ball or **berry** (which of course is the fruit of the plant) are **the seeds.** Let us begin by examining the flower.

3. *This is a capital flower to examine, for each part is very distinct and plainly seen.*

*Show the* **calyx** *with its* **five sepals,** *the* **corolla** *also consisting of* **five white or purple petals,** *and the* **five stamens;** *each with its* **orange-coloured anther** *resting on the top.*

*Show a flower from which all the other parts are ready to fall, leaving only the* **ovary** *or* **seed-vessel.** This ball and the seeds in it will ripen in time. *Open one and show the seeds inside.*



SECTION OF POTATO-FLOWER.

4. Who has seen the gardener setting these seeds? He does not put these seeds into the ground.

What does he set then? **He sets a small potato, or a piece of a large one.**

*Point out that, although the gardener sets these things,* **they are not seeds,** *because* **they do not come from the flower.**

*Tell, too, that if he were to set one of the actual seeds from the seed-vessel it would grow up like other seeds. It would become a young potato plant.*

5. When were these plants set? They were set in the spring.

*Show that the plants are already* **bearing flowers and seeds**; *and remind the children that they must all be dug up before winter, or they would rot in the ground.* **This plant therefore lasts only one year.**

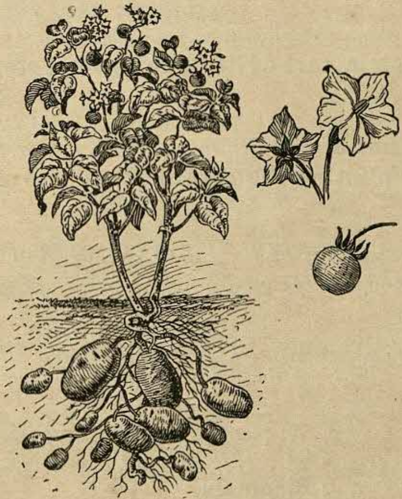
6. *Call attention to the ground in which the potatoes are growing.* **It is earthed up in ridges.**

*Show if possible a tuber, which has not been covered up. Notice that it is quite* **green on the exposed parts,** *and elicit from this the purpose of the earthing-up process.*

The plants are earthed up **to keep the growing potatoes from the sunlight and air.** If this were not done they would all get exposed, for they grow very near to the surface, and then they would all be green, and begin to sprout.

7. *Now dig up one of the plants, hold the stems in the hand, and show* **the potatoes,** *and* **the fibres of the real roots.** The plant has **fibrous roots.**

*Then shake the soil carefully from it, rest it on the ground, and let the children trace the stems bearing the potatoes. In this way lead them to discover for themselves that* **the roots** *of the plant* **are distinct from the parts which bear the potatoes.**



What do you learn from this? The potatoes which we eat **are not roots,** although they are in the ground.

Here is a potato; look carefully at it. Suppose we kept it till next spring. Can you tell me what difference you would find in it? We should find **white stems, with little leaves at the ends of them,** growing out from these **"eyes."**

The **"eyes"** are really buds, and buds grow on stems, but never on roots. This proves that the potato is not a root.

How would they get food to make them grow? The growing stems would **feed on the potato itself.**

*Compare this with what has already been taught about the carrot. In that plant the food-supply comes from a tap-root. The potato plant grows again on food which comes, not from the root, but* **from a part of its underground stem,** *which we call* **a tuber.**

This potato is a part of the underground stem swollen up into **a sort of ball,** which we call **a tuber.** We grow the potato plant **for the sake of the tubers of its stem.**

## III. PLANTS THAT LIVE YEAR AFTER YEAR

1. *Lead the children now to tell that, so far, we know there are two classes of plants in the garden.*

*One kind* **live only for a single year.** *We call them* **Annuals.** *They die down before the winter, and new seed must be sown the next spring.*

*The other class of plants* **live for two years.** *The plant itself supplies the food to start the second season's growth. These are known as* **Biennials.**

2. Can any of you find a plant in the garden that lives longer than two years?

*The children will no doubt point to the* **currant** *and* **gooseberry bushes.**

*The first and main point to be noticed is the difference between the stems of these plants and those we have already examined.*

*Contrast the* **dark, rough, hard, woody stems** *of these bushes with the* **green, soft, tender stems** *of annuals and biennials. Even in plants that last for two years,* **the stems,** *generally speaking,* **die down,** *and the food-store comes from the big fleshy root.*

*Note that the cabbage is to some extent an exception to this, for its* **hard thick stem does not die down** *to the ground.*

*It shares with the tap-root the duty of providing a food-store for the new year's growth.*

3. *Call attention, in the next place, to* **the number of stems** *which grow from the root of a* **currant bush.** *It probably has no main stem. Compare this with* **the short, thick, single stem of the gooseberry bush.**

Neither of these plants can grow into tall trees. The stems grow either direct from the roots, or from a short thick trunk.

4. *Notice the hard, thick outer skin or* **bark** *which covers these stems. This is* **Nature's protection** *against the winter frosts, so that the plants* **may live year after year.**

*Compare the more upright stems of the currant bush with the branches of the gooseberry, which arch* **something like those of a bramble.** *The currant bushes are taller in consequence of this.*

5. *Notice the* **thorns on the stems of the gooseberry bush.** *There are none on the currant bush.*

*Examine and compare the leaves and fruit of each. It is of course too late for the flowers now. In examining the fruit, crush one of each, and draw particular attention to the number of loose seeds enclosed with the juice inside the skin.*

*The children will remember from their earlier lessons that such a fruit is called* **a berry.**

Both these plants have pretty **net-veined leaves** of nearly the same shape.

6. The currant leaf is **larger,** and of **a lighter green** than that of the gooseberry. The leaf of the black-currant has **a strong smell**.

The currants **grow in clusters.** Each currant has a tiny stalk joining it to the thicker stalk, which springs from the angle between two leaf-stalks.

Only a **single gooseberry** grows **on a stalk.**

7. *Point out that the currant is a* **small smooth-skinned**

**berry**; *the gooseberry is much larger, and some varieties of the berries are* **covered with short hairs.**

*Elicit that there are three kinds of currants, known from the colour of the berry*—**black, white,** *and* **red**; *and two kinds of gooseberries*—**red** *and* **white.**

*Call upon the children to notice that such plants as the* **rhubarb,** *the* **iris,** *and the* **Solomon's seal,** *live on for many years. Remind them that during the winter it is only the part in the ground which remains alive. All the rest dies down, and new stems and leaves shoot out from these root-stocks the next spring.*

### SUMMARY OF THE LESSON

1. Carrots, parsnips, and turnips are biennials. Their thick, fleshy root is the food store. They do not flower till the second year.

2. The potato is a tuber, not a root. It has "eyes." The new plants spring from the "eyes" or "buds." The seeds of the plant grow in a little round ball, which is left behind by the flower when it dies.

3. Most plants that live on year after year have hard, woody stems. The stem itself as well as the underground part of the plant lives through the winter.

4. Some plants send up new growth every spring from a root-stock, which lives on in the ground year after year.

## Lesson XXXIV

## MEADOW PLANTS

Brown's picture of the "Meadow Grasses" should be provided for recapitulation work in the school-room.

### I. INTRODUCTION

*THIS lesson should follow the order in the book, and of course must come after the one which deals with the farm crops. Like* *other observation lessons, it should be given on the spot, so that the children may have the opportunity of examining, with the teacher's help, all the plants named.*

*On the way to the meadows the teacher should lead the children to recapitulate the chief points they have already learned in connection with grasses, clover, and vetch—their stems and leaves.*

### II. Cultivated Plants

1. *On arriving at the meadow proceed at once to examine the stalks of grass and clover. Find a creeping stem of white clover, and call the children together to examine it.*

We find here a branching stem or **runner,** which after going a little distance **takes root** and **forms a new plant.** Plants of this kind **increase without seeds.**

Look at the leaf of the plant, and tell me what it is? It is a **clover plant.**

2. Let us now see whether we can find a grass plant which does this Ah, here is one.

It has runners just like those of this clover. We call these runners **stolons.**

*Explain that we do not find runners in all kinds of clover and grass. We know these two* **because of their runners.**

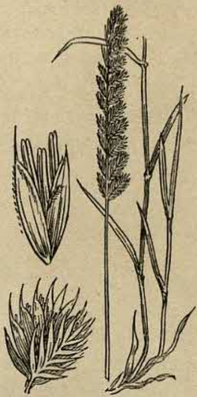
This kind of grass is known as **meadow foxtail,** and it is one of the best grasses grown, for **it makes excellent hay.**

This clover is known as **Dutch** or **white clover. The other clovers have no runners.**

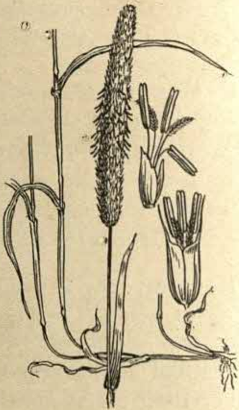
3. *Proceed next to gather, examine, and compare the flowers of as many varieties of grass as are available, the object of the examination being to show how the spikelets are joined to the stalk:—*

(*a*) *By* **very short foot-stalks,** *as in* **dogs-tail,** *and* **Timothy grass** *or* **meadow cats-tail.**

(*b*) *By* **longer foot-stalks,** *as in the* **yellow oat-grass.**

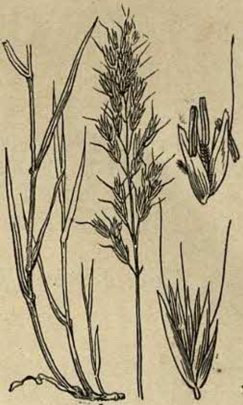


DOG'S-TAIL GRASS.

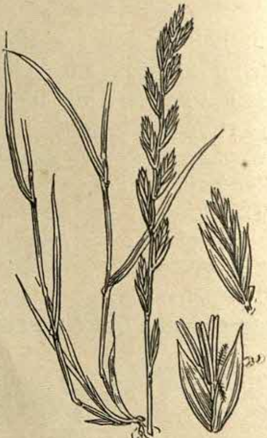


TIMOTHY GRASS.

(*c*) **Without any foot-stalk,** *as in the* **rye-grass.**



YELLOW OAT-GRASS.

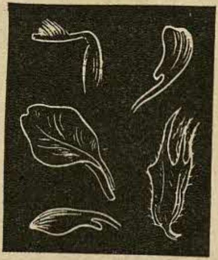


RYE-GRASS.

4. So then we learn that there are different kinds of

grasses, and that it is easy to tell one from the other. One kind is known **by its stolon** or **runner**; others **by the form of their ears** or **spikelets.**

THE VETCH.



THE VETCH DISSECTED.

In some there is **no foot-stalk** to the spikelet, and the ear is **like that of wheat or barley.** In others **the ear is bushy** like a tail, and in others again the flower spreads out **like that of the oat.**

RED CLOVER.

5. *Pass on next to examine the clover and vetch side by side. The children already know something of these two plants. Let them compare* **the upright stem of the clover** *with the* **trailing stem and clinging tendrils of the vetch.**

*Gather some of the flowers of each. Call attention first to the vetch flower.*

Do you remember seeing any flower like this before? Yes; it looks **like the flowers** of the **pea and the bean.**

What name did we give to those flowers? **Butterfly flowers.**

6. *Dissect the vetch blossom and show that this is* **also a butterfly flower**. *Let the children find its parts as in the larger flowers of the pea and bean. Lastly, turn to* **the head of clover,** *and dissect this to show first of all that it is simply* **a cluster of these same butterfly flowers,** *and then to find* **the distinct parts in each one,** *just as we have found them in the others.*

7. The **clover** and the **bean,** the **vetch** and the **pea,** are **very much alike.** They are all, in fact, the same kind of plant.

Why does the farmer cultivate all these plants in the meadows? Because they all make **good food for his sheep, cattle, and horses.**

## III. PLANTS THAT GROW WILD

1. *Tell that, besides these meadow plants which the farmer grows for his sheep and cattle, there are many others that* **he does not want** *in his fields.* **They are weeds;** *they* **grow wild,** *and spring up year after year. Some of them* **the animals never touch,** *and he would be glad to get rid of them, but he cannot do so.*

2. THE BUTTERCUP.—*Find both varieties of this*—**the upright** *and* **the creeping buttercup.** *They are sure not to be far apart. Call special attention to the latter, pointing out that it has* **a creeping stolon** *or* **runner.** *There is no runner in the other.*

Both plants are alike in every other respect. Each has **deeply-cut, net-veined leaves,** and **strong stems,** with flowers and leaves growing on the same stalk. The seeds are in a hard case—**a sort of nut.**

The field seems to be full of these pretty yellow buttercups, which all children love so much. The reason is that **the cattle and sheep never eat them.** They do not like their **bitter burning taste.**

3. *Remind the children that in damp low-lying meadows* **the marsh marigold,** *another plant very much like the buttercup, is sure to be found in the spring months; but of course it is done blooming now.*

This, like the buttercup, is **a bitter, almost poisonous flower,** and **sheep and cattle never eat it.**

1. The Daisy.—*Tell that this pretty field flower (it has already been described), although such a favourite with most of us, is* **not a good plant for the meadows** *in the farmer's eyes. Let the children examine the plant—leaves as well as flowers.*

It takes up much room, **because its leaves lie close on the ground,** and for this reason they **cannot be eaten by the cattle.** The flower grows on a hairy stalk.

1. The Plantain.—*There will be no difficulty in finding this plant in any meadow. When found proceed to examine it.*

*Notice first its* **large broad leaves,** *which spread out and* **take up much room.**

The leaf has **five stout ribs**; hence it is sometimes called the **rib-wort,** or **rib-grass.** But of course it is not really a grass. Why?

*Pluck off one of the leaves, and show that the fibres correspond with the ribs.*

*These fibres are very strong, and* **the leaf is hard to pluck.**

2. *Call attention next to the long spike or stalk on which the flowers grow.* This lengthens out into a long "**bob-tail,**" which is often **given to cage-birds.**

*The manner in which the seeds are attached to the stalk should be noticed.*

There is **no foot-stalk**: each seed is, as it were, simply stuck to the sides of the stalk. If the outer case or husk is removed from the ripened stalk, and opened carefully, **the shiny-looking seed** will be found inside.

*Tell that this plant, like some of the others,* **takes up much valuable room,** *and is* **not eaten by the cattle.**

THE PRIMULA FAMILY.—*These, although not now in bloom, should be mentioned among the meadow plants. They are spring flowers, and include the* **cowslip** *and* **oxlip,** *plants of the same family as* **the primrose** *of the woods, banks, and hedgerows. They have already been described.*

THE DOCK.—*Children are well acquainted with this, and will at once point it out.*

It has **net-veined leaves,** broad at the base and **tapering to a point.** The plant is held firmly in the ground by a **stout tap-root,** and can be destroyed only by digging up the entire root. This is called **docking.**

THE THISTLE.—*Find a thistle in flower, cut it down near the ground, and proceed to examine it, calling attention first to the* **white milky-looking sap** *which oozes from the wounded stem.*

The thistle has **narrow strong leaves** with **notched** or **indented edges** and **sharp prickly points.** The surface of the leaf is not flat but wavy, and each leaf grows from a stem without any leaf-stalk.

The flower is **a close cluster of florets** at the **head of the stem.** The curious thing about this flower is that the ripe seeds are enclosed in a light downy substance—**thistle-down**—and so are scattered about on the breeze.

These plants are amongst **the farmer's worst enemies**; and a careful farmer never allows those seeds to ripen, or his fields would soon be overrun.

Cattle will not touch the thistle, but to the donkey it is a special luxury.

### SUMMARY OF THE LESSON

1. There are many kinds of meadow-grass. We know them by their flower.

2. Clover and vetch belong to the pea and bean family. They have butterfly flowers.

3. Buttercups and daisies, primroses and cowslips, are all weeds. They grow wild.

4. The plantain, dock, thistle, and dandelion are also weeds. They are some of the farmer's worst enemies.

# Lesson XXXV

## WATER-PLANTS (A JULY RAMBLE)

Brown's picture of "Plants that grow in Water" should be provided for recapitulation work in class.

### (A.) PLANTS THAT GROW IN STILL WATER

### I. INTRODUCTION

*TAKE the children to a lake, a pond, or a slowly-moving, shallow stream. On the way lead them to tell what they can of the nature of the grasses, as described in Lessons XXXI. and XXXV.*

*The special points to be elicited are that those plants have tall, round, hollow, jointed stems, with long, narrow, ribbon-like, parallel-veined leaves springing from the joints; that the lower part of the leaf or blade forms a sort of sheath, which encircles the stem; that the flowers are arranged in spikelets, either closely fixed to a central stalk, as in wheat, or hanging in a loose cluster, or panicle, as in the case of the oat.*

## II. The Sedges

1. *When all this has been questioned out, step by step, lead the children to the pond or stream, and call their attention to the* **reeds** *and* **sedges** *that grow in abundance* **on the margin of the water.**

*Point out that at first sight these water-plants, in their general appearance,* **bear a marked likeness to the grasses.** *They have* **tall stems,** *and* **long ribbon-like leaves** *springing from them.*

The common reed is from **six to eight feet in height.**

2. *Cut down one of the plants now, and examine it more closely. The first thing to be observed is that these* **stems are not round** *like the stems of grass, but* **sharply angular.** *Show the cut edge, and point out next that* **the stem is solid,** *while that of the grasses is hollow.*

*Notice that the leaf is joined to the stem* **by a sheath,** *but* **the sheath is not split** *on the opposite side, as it is in the grasses, and the leaf, like the stem, is angular.*

3. *Tell that these stems spring from* **a thick, stout, underground stem,** *which is called a* **root-stock,** *and creeps along just below the bed of the water.*

These water-plants, which seem at first sight to resemble the grasses, form a class by themselves, and are known as **sedges.** The **common reed, the branching bur-reed, the bulrush and the mud-rush** are in many respects similar to the sedges; but some of them, like the bulrush, have rounded stems.

4. *Proceed next to examine the flower, for these sedge-plants are now in the midst of their flowering season. Call attention to the* **spike of flowers** *at the very top of the stem.*

These are **stamen-bearing** or **male flowers.**

*Point out the* **two or three clusters of other flowers** *lower down on the stem. Compare them with those of the top spike.* They are **pistil-bearing** or **female flowers.**

5. *Tell that in this class of plants the flowers are always male or female, but that* **stamens and pistil** *are* **never found together in the same flower,** *as they are in the grasses.*

*Notice that they have very little of the appearance of flowers; they are altogether wanting in the gay colours which we usually look for in the flowering part of the plant.*

## III. THE FLOWERING RUSH

1. *Compare these sedge-flowers with the* **beautiful pink clusters** *of the graceful flowering rush. This plant is sure to be found growing in the near neighbourhood, for it is a* **very common water-plant** *in all parts of the country. Its natural home is in* **shallow ponds or lakes,** *or in a slowly moving stream, and it always grows at some little distance from the bank.*

*It flowers throughout June and July.*

2. *Get a cluster of the flowers if possible, and let the children examine them.*

*Notice that there are* **six flower-leaves**—*three inner and three outer ones,* **all of the same general character.**

*Strip them off one by one and show the stamens*—**nine altogether**—*with the pistil in the centre. Tell that when the pistil ripens, it forms a* **capsule** *or* **seed-vessel** *with a very large number of seeds.*

Here then is a perfect flower, quite different from those of the sedges.

3. *Notice next that* **the stem** *of this flowering rush is* **not angular but round,** *and that most of its long ribbon-like* **leaves spring direct from the root,** *and not from the stem.*

It looks a truly handsome plant, standing up out of the water with its **cluster of bright pink flowers at the top of that tall round stem.**

This flowering rush is **not one of the sedge family,** like the common reeds and rushes which grow near it.

## IV. THE WATER-LILY

1. *There should be no difficulty in finding one of these lovely plants, for they are met with in almost all our* **shallow ponds and pools** *throughout the country.*

*Notice the* **large heart-shaped leaves** *which* **float on the surface of the water,** *with the* **big, round, partly-opened flower** *standing up in the midst of them. Notice too the* **rich delicious fragrance,** *which is wafted by the breeze from this beautiful great water-flower.*

2. *If it is possible to secure one of them, do so, and let the children examine it.*

It contains an unusually **large number of flower-leaves,** both sepals and petals, and the stamens too are very numerous.

The pistil of the ripened flower forms **a flask- or flagon-shaped seed-vessel.**

There are two varieties of the flower—the white and the yellow. Both are in bloom during July and August.

3. *Tell that in some parts of the country the yellow water-lily is known by the curious name of* **can-dock,** *and in other districts it is called the* **brandy-bottle.**

The name **brandy-bottle** is given in reference to the **flagon-shaped seed-vessel.**

**Can** in the other name also **refers to the same thing,** and the word **dock** to the common **dock-leaf**—the leaves of the water-lily having some sort of likeness to that leaf.

## V. THE YELLOW IRIS OR WATER-FLAG[1]

1. *Find this plant next. It will be readily seen from its* **large, conspicuous, yellow flowers.** *It is one of the most beautiful of our water-plants. It is very common in all parts of the country, and is to be found in the* **shallow bed of the stream** *or among the vegetation fringing the banks.*

2. *Notice the* **long sword-shaped leaves** *which stand up out of the water. In some parts of the country this plant is called the* **segg**, *from a very old English word meaning* **a sword.**

*Tell that these leaves and stout flower-stems* **spring direct from a large, thick, underground stem** *or* **root-stock,** *which creeps along below the bed of the stream.*

3. *Find one of the flowers, if possible, and examine it. It is getting rather late for them now, as they rarely last beyond*

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[1] *If time permit, further search should be made among the tangled mass of vegetation that fringes the stream for :—*

(*a*) The yellow and purple loose-strife,—both of them tall plants, one bearing spikes of beautiful purple flowers, the other clusters of bright yellow ones.

(*b*) The greater willow-herb, another tall plant whose striking pink flowers can be seen towering above the rest of the vegetation around.

(*c*) The meadow sweet, a tall, graceful plant, one of the commonest of those that fringe the river bank. It is in flower now, like the rest. The flowers are of a creamy white colour, and grow in large clusters at the top of the stem. They have a powerful, fragrant smell, something like almonds.

(*d*) The water avens, a smaller plant, with large bell-shaped reddish-pink flowers.

(*e*) The water ragwort, with its brilliant yellow flowers.

(*f*) The water figwort, and the wax-like flowers of the forget-me-not.

*All of these are in bloom now (middle of July).*

*the middle of July. There are always two or three flowers on each stem.*

*Point out that this is unlike most of the flowers we have examined. It consists of nine distinct parts, but the* three outer segments of the flower are the largest and most conspicuous. When the flower decays it leaves behind **a large capsule,** three inches in length. This is the seed-vessel; and it contains many seeds. *Show one of these.*

## (B.) PLANTS THAT GROW IN RUNNING WATER

*Take the children now to the brook. Explain to them on the way that, just as some plants have their home in the still water of pools and ponds, so others prefer running streams. Many of them could not live in still water.* Let us try to find some of them.

### I. THE WATER BUTTERCUP

1. *Point out the* **pretty white flowers** *which are peeping their heads above the surface of the water in a shallow part of the stream. There is* **nothing else to be seen**—*leaves, stalks, all the rest of the plant are under the water.*

*Tell the name of this plant*—**the water buttercup.**

*The name will probably puzzle the children at first, for the flower has to them very little connection with the* **yellow buttercup** *of the meadows.* **The flower is white, not yellow.**

*Pluck some of the flowers, and compare them with some fresh-gathered meadow buttercups, in order to show that both are alike in structure.*

2. The calyx consists of five separate sepals; the corolla of five separate petals; the stamens form a yellow cluster in the centre of the flower, and when they fall a number of seed-vessels, each containing a single seed, are left behind.

*Have the parts of the two flowers laid out for comparison* *side by side on a sheet of paper. The petals of the water buttercup are longer than those of the meadow buttercup. They are* **white with a yellow spot near the base.**

This plant is only found in running streams; never in still water. It flowers in June and July.

## II. THE WATER-CRESS

1. *The children are of course quite familiar with this plant as an adjunct to the table at meal-time. Many of them have doubtless seen it growing before to-day, but few in all probability have taken much notice of the plant and its tiny white flowers.*

*As this is the flowering season, it will be a good time to examine the plant. It flowers in May, June, July, and August.*

*A* **clear, shallow, gently-flowing stream,** *with* **a gravelly bottom,** *is its natural home, and it grows in such profusion that it will be found without much searching.*

2. *The plant itself needs no description. Call attention to the matted tufts of* **slender white fibres** *which hang from the stems. These of course are* **the roots.**

*Proceed to examine and dissect the small white flowers:—*

The calyx consists of four separate green sepals; the corolla of four **small, separate, spreading, white petals.**

*Strip these off, and show the stamens (six in number, two of them shorter than the rest), with the pistil standing up in the midst of them.*

*Remind the children that this was exactly* **the structure of the wallflower** *which we examined some time ago; and then find one of the fully-formed seed-vessels.*

*Point out that the seed-vessel of the watercress is* **a pod with two divisions side by side,** *exactly like that of the wallflower.*

### III. FOOL'S CRESS

*This plant, which is sometimes called the water-parsnip, will most likely be found growing side by side with the water-cress. At first sight it bears some resemblance to the water-cress, but it is an easy matter to tell one from the other.*

The flowers of this plant are not at all like the water-cress flower. They are borne in clusters, and their stalks all spring from one point, something like the ribs of an umbrella. The leaves too are longer, more pointed, and of a paler colour than the leaf of the water-cress.

*Find a specimen of the plant, and let the children compare the two. Like the water-cress, it is now in bloom, so there need be no difficulty.*

*Explain that, as this Fool's cress is a hurtful plant, it is very necessary to tell it at a glance from the wholesome water-cress which grows near it, in order to prevent mistakes.*

### SUMMARY OF THE LESSON

1. Sedges are grass-like plants, but they have solid stems, and bear male and female flowers.

2. They grow in still water; they include reeds and rushes of all kinds.

3. The flowering rush is not one of the sedge family.

4. The water-lily and yellow iris are beautiful flowers that grow in still water.

5. The water-buttercup, water-cress, and fool's cress grow in running water.

## Lesson XXXVI

## OUR LANES AND HEDGES

Brown's picture of "Our Hedgerow Plants" should be provided for recapitulation work in the school-room.

## I. INTRODUCTION

1. *DURING the many rambles throughout the year the teacher cannot have failed to impress the children with the peculiar beauty of the green winding lanes, and their free-growing tangled hedges on either side, rich at each succeeding season with their gifts of blossom, leaf, or berry.*

2. *Before the snows of winter had altogether cleared away, their earliest walks showed them the* **beautiful long tassels** *or* **catkins** *of the* **hazel.** *A month later or thereabouts they were charmed with the* **snow-white blossoms of the black-thorn,** *which in turn were succeeded by the still richer* **wreaths of the fragrant hawthorn** *or May-blossom.*

*Summer came and brought its* **wealth of wild roses and woodbine,** *making the green lane again a lovely picture, and filling the air with their* **sweet perfumes.**

*Autumn will follow, and the wealth of blossom will then give place to a no less liberal gift of* **berries of every hue**—*the* **blue-black glossy fruit of the sloe**—*the* **rich scarlet "hips and haws"**—*the* **crimson coral-like clusters** *of the berries of the* **Guelder rose**—*the* **yellow, orange,** *and* **red berries of the woodbine**—*and many others—the mingled richness of whose colouring will almost make up for the loss of the summer flowers.*

3. *The lesson, which of course should be an outdoor one if possible, would be almost equally effective in the autumn as in the flowering season. But it would be easier to awaken the interest of the children by taking them first for a ramble through the green lanes* **during the month of June,** *when most of the plants in question are in full bloom. After seeing the flowers the children would naturally have an added interest in watching for the fruits that are to follow.*

*Needless to observe, it is impossible within these limits to deal exhaustively with all the hedgerow shrubs and bushes. A* *few characteristic plants have been taken here; but of course the teacher can, and no doubt will, add to the list.*

## II. THE HAWTHORN, OR WHITE-THORN

1. *There will be no need to direct the attention of the children to this, for its* **snowy blossoms,** *with* **their exquisite fragrance,** *are universal favourites among young and old alike.* As an ornament to our hedges at this time of the year it has no equal, and **its foliage is as elegant as its blossoms.**

Its common name, **May-blossom,** reminds us of the time when a branch of the beautiful flowers was always used to form **the crown of the May-pole** for May-day sports; but the blossoms are never seen so early as this now.[1]

2. *Tell that the hawthorn is a great favourite with insects. Bees feed on the juices of its flowers; caterpillars on its leaves.* It supports no less than **twenty-four different varieties of insects.**

*Notice its beautiful sister tree—the* **red May.**

It is said that when the hawthorn grows on a clay soil the blossoms turn from white to red.

3. *For the sake of refreshing the memory of the children, it would be well now to produce if possible, from the school museum, a specimen of the* **"haw,"** *the* **bright red fruit** *which is left behind when these blossoms fade.*

## III. THE BLACK-THORN OR SLOE

*The teacher will most probably have to point out this* **spiny bush** *to the children, for there are* **no flowers on it now** *to*

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[1] This is partly due no doubt to the "alteration of style," which places May-day eleven days earlier than it was a hundred years ago.

*guide them.* **The flowering season is in April.** *The flowers come before the leaves.*

*Tell that the name black-thorn has nothing to do with the colour of the blossoms, for these are even whiter than those of the white-thorn or May.*

*Cut off a spray and show that where the flower once grew there is now* **a tiny dark green ball,** *which of course is the* **fruit** *or* **seed-vessel** *of the flower.*

This as it ripens will swell up into a **small glossy blue-black plum,** which we call a **sloe.** It is remarkable for its particularly **sour taste.** One variety of sloe is called the **bullace plum.**

*Tell that, like the white-thorn, this bush* **supports immense numbers of insects,** *chiefly moths.*

## IV. THE GUELDER ROSE

1. *Many of the children will no doubt recognise this pretty shrub by its familiar name of* **snow-ball tree,** *a name which it gets from its large flat* **clusters of white flowers,** *that are in full bloom during this month.*

*Tell that* **the leaves,** *which are now a bright green, will change* **in the autumn** *to a* **rich crimson hue.**

2. *Ask the children to remember to be on the look-out for these, and tell them that they will at the same time find the branches hung thick with* **clusters of brilliant red berries.** The tree is then quite an ornament to the hedges where it grows.

## V. WILD ROSES

1. *These summer gems of the green country lanes require no searching out, for their elegant blossoms are conspicuous in every sunny hedgerow throughout the country, and the sweet perfumes of most of them scent the air, to tell of their presence even before the flowers themselves catch the eye.*

*Notice how the* **strong, rambling, straggling, prickly stems** *mount upward among the other growth of the hedgerow, always finding the sunniest spots for their clusters of lovely flowers.*

*Call attention also to the* **elegant compound leaves,** *consisting of five or seven leaflets with* **saw-like** (*serrated*) **edges.**

There are several distinct varieties of this plant to be met with in our English hedges, but we shall notice only the following:—

2. THE WHITE DOG ROSE.—This is sometimes known as **the field rose.** It is very abundant in all parts of the country, and bears clusters of **milk-white blossoms** on purple flower-stalks. The flowers of this one, although very beautiful, **have little or no perfume.**

3. THE COMMON DOG ROSE.—This is even more widely known than the white rose. The **flowers do not grow in clusters,** but hang two or three together in wreaths along the straggling stem. They vary in colour from **a very deep pink to a blush**—almost a white, and have **a rich, delicate perfume.**

The leaves are **rough,** while those of the white rose have **a shiny surface.**

4. THE SWEET BRIAR.—This beautiful member of the family, although met with as a hedgerow plant, is more commonly found in the open copse. Its blossoms are **smaller than those of the dog rose,** and usually a **brighter, deeper pink. The leaves** as well as the **flowers** give out a **delicious fragrant odour.**

*Remind the children that the fruit of all these members of the rose family are,* **the bright red shiny "hips"** *which make such a brilliant show in the autumn. Produce a specimen "hip" from the school museum, and ask the children to be on the look-out for them later on.*

## VI. THE WOODBINE OR HONEYSUCKLE

1. *Pluck a cluster of these lovely flowers, for they are in full bloom now almost everywhere. They may be* **yellow, white,** *or* **pink** *in colour, but they never vary in their* **delicious fragrance.**

*Call attention to the* **long, straggling, woody stems,** *which run up the tree trunks, and twine themselves among the other plants of the hedgerow, or anything they can find for a support.*

*Notice their habit of twining.* They are **twining stems,** and like those of the bindweed and the kidney bean, they **always twine from left to right.**

2. *Tell the children to look out by and by for the clusters of berries, which will take the place of the flowers in the autumn.*

When these **berries** first appear they are **green,** but they gradually change, first to **yellow,** and then to **orange,** and when they are quite ripe they are a **bright transparent red.**

## VII. THE HAZEL

1. *The children will probably be surprised at first to have their attention called to these shrubs of the hedgerow, for they have* **no flowers to attract attention now.** *Their flowering season was very early in the year—as far back as* **February or March.**

*Lead them to describe these flowers as far as they can from memory—the* **long slender tassels of male flowers** *above, and the* **small rounded female flower** *lower down on the stem, looking something like a sort of bud, with tufts of bright crimson threads,*—**the stigmas of the flower**—*hanging out of it.*

2. *Cut a twig now, and point out that, although the flowers*

*have gone, there is a something growing where the female flower once grew*—**a sort of green thing,** *which will in time take the form of a cluster of nuts*—**hazel-nuts.**

*The children will of course readily tell of the fun of* **"going a-nutting"** *in the autumn.*

The nuts which they then gather are **the fruit of those hazel flowers** which come in the very early spring.

### SUMMARY OF THE LESSON

1. The hawthorn blooms in May and June. The bright red "haws" are the fruit of this plant.
2. The fruit of the blackthorn is the sloe or bullace plum.
3. The crimson flowers of the guelder rose produce brilliant red berries in the autumn.
4. "Hips" are the fruit of the wild roses.
5. The flowers of the honeysuckle leave behind clusters of bright red berries.
6. The female flower of the hazel forms a cluster of nuts.

## Lesson XXXVII

## PLANTS OF THE HEATH AND MOOR

Brown's picture "Plants of the Heath and Moor" will be required for recapitulation.

*THERE are few parts of the country where tracts of open waste land, of greater or less extent, are not to be found within easy walking distance. In some districts, such as the north and west of England, North Devon, Wales, Scotland, and Ireland, these waste tracts are of large extent, and are called moors or moorlands. In most other parts the waste lands are smaller in extent, and are known as heaths or commons.*

*They who know those wild rugged waste lands best agree that it is impossible to find anything more lovely; and such* *districts owe their beauty and charm almost entirely to the* **peculiar kind of plant-life,** *which grows there* **in rich abundance on every side,** *but is to be* **met with nowhere else.** *We will now examine some of these* **plants of the heath and moor.**

*Where the district permits, the teacher should take the children for a ramble as usual, so that they may see for themselves, and examine the plants in their natural home. Failing this, he should if possible procure* **specimens of the plants in flower.** *Where even this cannot be done,* **good pictures** *must take their place. The best time for a ramble would be about* **the end of June or the beginning of July,** *when most of the plants are in their flowering season.*

### I. FURZE OR GORSE

1. *Most children are familiar with this plant, for it is met with in abundance on every bit of open heath or common all over the country.*

*They know that* **clumps of it are cut down in the autumn** *and carried away as* **furze faggots** *for winter use, and they have seen the places on the common left bare of everything but the stumps, when this faggot harvest has been gathered in. But the following spring they have found the plants* **growing again** *as vigorously and luxuriantly as ever. Lead them to tell of this as soon as their attention is called to the plants.* **The furze or gorse is usually cut once in three years.**

What a shame it seems to cut them down. How beautiful they look dotted about in thick clumps all over the common, with their banks of **prickly stems and foliage** rising five or six feet in height, and their **masses of brilliant golden-yellow flowers.**

2. *Examine the flowers now. The children will no doubt recognise them as old friends, for they are* **pea-shaped flowers.** *Let them point out and name the different parts of*

*the flower*—**standard, wings, keel**—*exactly the same as they found in the flowers of the* **pea, bean, clover,** *and* **vetch.**

*Tell that they are great favourites with the bees, for they are rich in honey.*

The bees have a good time with these flowers, for they begin to bloom in February, and **last continuously till the autumn,** living out all the flowers of spring and summer.

3. *Tell that in some parts* **the furze is planted as a hedge,** *and in others the young tender branches are* **used as fodder for horses and cows.**

The seed is sown for this purpose on poor kinds of land which will grow nothing else. The plants are **ready to cut in the second autumn.**

*Point out that these great clumps of shrubs, besides being an ornament to the heath, make* **capital cover for game.** *Indeed, they provide a* **home for hosts of wild animals and birds,** *and food for* **countless swarms of caterpillars and insects** of many kinds.

In some parts of the country they are called **whins**; and there is also a smaller kind known as the **dwarf furze,** which is seldom more than **two feet in height.**

## II. Broom

*Illustrating either with the living, growing plant in its natural home, or with specimens, or a picture, as opportunity permits, tell that these plants are natives of the high moorlands.*

They are large shrubs, and the tangled masses of their stems and leaves **make a dense thicket,** which in the flowering season is crowded with rich blossoms.

*Call attention to the* **large, brilliant, golden-yellow, pea-like flowers,** *which are in full bloom at this time of the year.*

*Tell that by and by when the flowers fall they will leave behind them* **large black pods** *like pea-pods, full of seeds.*

*Explain that this is the plant* (*Planta genista*) *which gave its* *name to a long line of our English kings, commencing with Henry II. Tell the story.*

## III. HEATHER

*Show this plant as before. Tell that, although not so common as the furze, it is met with on many of the breezy uplands in the southern parts of the country. But it is found in wild profusion* **all over the waste lands** *of Western and Northern England, and in Wales and Scotland.*

It grows in **thick bushy clumps** about eighteen inches high, with long straggling branches. Its leaves are pointed, and grow in clusters here and there along the stem—three large ones and several smaller ones springing from the same joint.

*Draw attention to the lovely little* **crimson-purple, vase-shaped flowers.** *Tell that they hang in thick clusters one above another. The hill-side from a distance seems to be clothed in purple.*

These flowers are immense favourites with the bees.

## IV. THE COMMON HEATH OR LING

*Show the plant, and call attention to its tiny flowers.*

They are not pitcher-shaped like those of the heather, but **the petals are divided,** to form **open bell-shaped blossoms.** They are usually of **a pale purplish-pink colour,** but some kinds are **white.** They are rich in honey, and hence are great favourites with the bees.

*Notice the plant itself.* It is a **low straggling shrub,** with tough woody branches, and the tiny leaves grow thickly along the shoots.

*Tell that this plant when cut down is put to many useful purposes.*

It makes **thatching for houses, fences** for fields, and **brooms** for sweeping purposes; and it is also employed in **tanning, brewing,** and **dyeing.**

## V. THE CROSS-LEAVED HEATH

*Show the plant, and point out its beautiful* **little wax-like flowers.** *They are* **vase-shaped** *like those of the heather, but smaller and rounder. They are usually of* **a pale blush-red** *colour, but some kinds are white.*

*Notice that they hang in thick clusters at the top of the stems, and that* **every flower in the cluster turns in the same direction.**

This plant is smaller than the other heaths. It never grows more than a foot in height. It has **small hairy leaves** grouped in fours along the stems.

## VI. BERRIED SHRUBS OF THE HEATH

*Intermingled with the furze and heather of our commons and heaths, clumps of berry-bearing shrubs are everywhere abundant. These are not all to be met with in the same districts, however, and each teacher must select for himself. Among the most widely distributed are the* **common blackberry** *or* **bramble,** *the* **dewberry** *or* **grey bramble,** *the* **cranberry**, *and the* **bilberry.**

The blackberry is too well known to need any further description here; but its beautiful flowers are now in bloom, as are those of the dewberry. *They should be examined. See Lesson XXX.—Information for the teacher.* The cranberry and the bilberry both bloom in May and June.

## VII. THE FERNS AND BRACKEN

*It would be impossible to pass over these lovely, lace-like, feathery ornaments of the common, heath, and moor without notice. Space, however, will not allow of any detailed description of the plants here, as that would of course involve an inquiry into their nature, and a comparison between them and the flowering plants.*

*It will be sufficient for the present, after calling attention to their refreshing beauty and elegance, to notice briefly the main points of difference between them and all other plants which are now familiar to the children.*

**Ferns have no flowers.** Hence they bear **neither fruits** (seed-vessels) **nor seeds** like those of other plants.

The lace-like leaves are called **fronds.** The seeds, or **spores,** grow on the **under side of the frond.**

Ferns and bracken belong to the same family of plants. Ferns send up single fronds from the root; the **bracken sends out branching fronds from the main ones.**

*Promise the children a day with the ferns later on.*

### SUMMARY OF THE LESSON

1. The furze or gorse has prickly stems and leaves, and brilliant golden-yellow butterfly flowers.

2. The broom is another heath plant. It has large yellow butterfly flowers.

3. There are three kinds of heath or heather—the purple heather, the heath or ling, and the cross-leaved heath.

4. The blackberry, dewberry, cranberry, bilberry, and many other berry-bearing shrubs grow on heaths and commons.

5. Ferns and bracken have no flowers. They are met with on all our heaths and moors.

## Lesson XXXVIII

## AUTUMN

Brown's picture of Autumn should be provided for recapitulation work in the school-room.

*The changes during this season are so many, and extend over so long a period, that it would be impossible to observe them all at one and the same time.*

*The children should be encouraged to note carefully day by day what is going on around them, and report to teacher from* *time to time as usual. He of course would take care to guide them in the observations they are to make, and note down for future reference the various reports as they are brought in to him.*

*The lesson, which is intended to summarise all these changes, would be most effective, if it took the form of an outdoor ramble, say some time near the end of October.*

## I. THE DAYS GET SHORTER

*Before setting out, endeavour in a chatty way to arouse the interest of the children in the things they see around them.*

*Commence by going back as usual to meet them at their games, and lead them to tell that they have now* **much less time for play** *when school is over, than they had in the summer-time.* **It gets dark so much sooner.** *They want a light at tea-time now, and there is no time for outdoor games afterwards. They are glad to amuse themselves in the house with a book during these long evenings.*

*The mornings too are darker. The sun* **rises later** *in the mornings and* **sets earlier** *in the evenings, than it did in the summer.* **Each day is getting shorter** than the one before it.

## II. NATURE'S EVENING

1. *By encouraging the children* **to measure one another's shadows** *on the ground at noon from day to day, the teacher will have helped them to observe that* **the sun does not mount so high in the heavens now** *as it did in the summer.*

*Deduce from these facts that the sun not only shines on us for a shorter time every day, but* **it has less power to warm the earth** *than in the summer.*

*The children observe for themselves that the mornings and evenings are quite chilly now.* **The days are getting colder as well as shorter.**

2. *Remind them that the thin, light clothing, which we wore in*

*the hot summer-time, has now been changed for* **thicker and warmer garments.**

*Refer to the sheep in the fields. Their woolly fleeces, which were cut so close for the summer,* **have now grown quite thick again.** Nature is looking after these animals, in providing them with **a new thick overcoat** in readiness for the coming cold weather.

3. *Call attention to the* **cat's fur.** *It is quite* **thick and close now,** *and if we take puss on our knee, we do not find our clothes covered with hairs, as we always do in the hot summer-time.*

**Nature** in this way **takes care of the cat, and all fur animals,** such as the rabbit, hare, fox, weasel, and others. In the hot weather, when they want to be cool, **their fur** little by little **falls out**; but as soon as the cooler autumn weather comes, **the fur begins to grow again,** so that they are sure of a thick, warm coat for winter.

4. *Notice too that at this time of the year, when we are out walking,* **we always seek the sunny side of the road,** *and not the shady side. We are glad of all the sun we can get. It is always* **cold in the shade now.**

*Tell that just as we spoke of* **spring** *as* **Nature's morning,** *and* **summer** *as* **Nature's noon-tide,** *so now we may call* **autumn Nature's evening.** Everything around us is now **preparing for winter, which is Nature's night.**

## III. The Ramble

1. The Falling Leaves.—*One of the first things to attract the notice of the children, as they walk along the lanes, will be the untidy appearance of the roadway, because of the* **leaves which lie scattered in all directions.** *Observe how the wind* **blows them into piled-up heaps on one side of the road.** *They fall in a shower at every gust of wind.*

Why do the leaves fall in the autumn? Because the trees do not want them any longer. **Their work is over for the year.**

2. *Remind the children that in spring we saw the young buds begin to burst out, and the blossoms open and die away, leaving the fruit behind to be ripened by the summer sun; and that now in autumn* **(Nature's evening)** *the trees, having finished their work, are* **preparing to take their rest.**

*Tell that the root, day by day in autumn, sends up less and less moisture and earth-food to the leaves, till at last it* **ceases to feed them altogether.**

*Lead the children to deduce the rest.* The leaves, of course, begin to fade, dry up, wither, and die. **As they die they fall to the ground.**

3. *Notice the trees themselves now.* The leaves on some of them are still green; but in most cases they are **changing colour.** They are **yellow, brown, orange, red, purple** —almost any colour but green.

*Tell that, as a rule, when a leaf begins to fade and die,* **its green colour gets paler and paler,** *till it changes at length to a* **yellow**; *but that in some trees* **the yellow then becomes an orange, the orange a red, the red a brown,** *and so on till the leaf is quite dead, and falls to the ground.*

4. *Call attention to the lovely effect of these autumn tints.* The chief reason for the variety of colours is that the leaves of one tree begin to fade earlier than those of another. Hence **the leaves are in all stages of decay.**

*The teacher should now produce the scrap-book, in which the specimen leaves of last autumn were gummed and labelled, so that the children may have an opportunity of finding, from among the heaps on the ground, any leaf he may call for.*

1. BUDS FOR NEXT YEAR.—*Remind the children that, bare and leafless as the trees will soon be, we shall know that they are* **only taking their winter sleep.**

*Cut now some twigs from an* **elm, a lime,** *and* **a beech.**

*Call attention to the spot in each where the leaf-stalk springs from the twig. Notice* **the little, oval, pointed shoot,** *which stands up in the angle between the two.*

2. *Cut one of them out with a pen-knife, open it carefully, and examine it. The children will of course recognise it as* **a bud.** *Tell that, as the old leaf dies and falls off,* **Nature provides young buds** *like these, which will burst out into fresh green leaves for the next season when the winter is over.*

*Call upon the children to note for themselves the* **thick, tough character of the outside leaves of these buds.** *Remind them that, when we shake the trees in the spring, we shake down showers of* **brown-looking husks or cases,** *which we call* **bud-cases.**

3. *Explain that the outer, or covering leaves of the buds get thicker and tougher as the winter approaches, till at last they form these brown husks or cases all over the tiny bud.*

The buds have been called **"the cradle of the leaves."** Nature takes care of the tender bud, by **covering it up close in this husk or case,** till the winter frosts are gone.

1. FLOWERS SCARCE; WILD FRUITS ABUNDANT.—*Lead the way towards the wood or coppice. Notice that here, as well as in the lanes and meadows, there is no longer a wealth of flowers such as we met with in the spring and summer.*

There are **still a few flowers**[1] to be found, particularly in the sheltered spots, but they are not nearly so plentiful as they were. We do not find the ground carpeted with wild flowers now.

*The teacher, of course, will know where to look for a few of these characteristic wild flowers of autumn.*

2. *Call attention to the stillness of the woods.* **We miss the hum of the insects.** We lose them when we lose the flowers. Why?

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[1] See Note—"Information for the Teacher."

But what else do we miss besides the flowers and the insects? **We miss the songs of the birds.** We miss most of the birds themselves.

*Remind the children that when the flowers cease to provide food for the insects, the insects in turn cease to provide food for the birds, and* **so the birds leave us for warmer lands,** *where they can still find plenty of insects to feed upon.*

3. *Elicit that the* **cuckoo** *disappeared nearly two months ago —in* **August.** *The* **swallows** *all left us last month—***September***—and one by one most of our singing birds disappeared as well.*

*The children should have been encouraged* **to observe the swallows from day to day** *as the season advanced, and to watch them at last* **collect together in little groups** *in preparation for their flight across the sea. Refer now to the date when this took place.*

4. *Remind them of their last year's autumn ramble. Call attention to some one or other of the* **wild fruits** *or* **nuts,** *which are hanging in abundance everywhere, and lead them to recognise and describe them one by one.*

PARTRIDGES AND PHEASANTS.—*The sharp crack of the sportsman's gun has no doubt been repeatedly heard during the ramble, and in all probability little parties of sportsmen, with their guns under their arms, and the dogs by their sides, have been seen crossing the stubble, on the look-out for* **a covey of partridges,** *or making their way through some plantation in search of* **pheasants.**

*The children, of course, are familiar with this. Lead them to tell all about it.*

**Partridges and pheasants are wild birds.** They are allowed to live and breed in the plantations and among the growing corn without interference of any kind till the autumn comes. Then they are shot for sport. **Partridge shooting begins on September 1st** (as soon as the corn harvest is over). **Pheasant shooting begins on October 1st.**

These birds, although wild, belong by law to the owner of the land, and no one else is permitted to shoot them. They are **game-birds.**

Those who try to snare or shoot them are called poachers, and are punished severely.

WORK IN THE FIELDS.—*On the way home, call attention to the farmer's fields.* **The plough is almost sure to be at work** *on some of them.*

*Explain that the farmer is already preparing for the next season.* He must **clean the land, plough** and **harrow it** now, for **he sows most of his corn before the winter sets in.**

### SUMMARY OF THE LESSON

1. Autumn is Nature's evening of the year.
2. The days get shorter and colder.
3. The leaves fade, change colour, and fall.
4. When the old leaves fall, Nature provides young buds, which are to take their place next spring.
5. We miss the flowers, insects, and birds.
6. Partridges and pheasants are seen in the fields and woods.
7. The farmer begins to plough his fields.

## INFORMATION FOR THE TEACHER

### AUTUMN WILD FLOWERS

*The following are a few of the commonest wild flowers to be met with in almost all parts of the country at this time of the year. The teacher should make his own selection.*

**The Pimpernel.**—A pretty bright scarlet flower, which blooms almost continuously from May till October, and is to be met with in waste places, and especially on the borders of arable land. The calyx consists of 5 cleft segments; the corolla has 5 small scarlet petals; there are 5 stamens, and the fruit is a small capsule.

**The Purple Loose-strife.**—A beautiful spike of small purple flowers, which is found by the banks of rivers and ponds. Its flowering season is all but over now; still, if one can be found, it will repay the trouble. Each flower of the spike has a calyx of 6 long and 6 short sepals; the corolla is in 6 parts; and there are 12 stamens (6 long and 6 short).

**The Scentless Mayweed.**—A composite flower (compare with the common field daisy) to be met with on the waysides. It blooms from June to October. The outer florets are white, and the inner disc yellow.

**The Corn Marigold.**—A large composite flower—the central disc and outer florets all yellow. It is met with in the cornfields, and flowers from June to October.

**The Meadow Saffron** is a very peculiar flower. Indeed there are none more delicately beautiful at this season of the year. It is found in meadows and pasture lands, but the farmer looks upon it as a dangerous weed, as it is hurtful to animals which eat it.

The flower is a large pale-purple tubular perianth of 6 segments, it has 6 stamens, and the ovary is a capsule with 3 cells. The leaves do not appear till after the flower dies.

## Lesson XXXIX

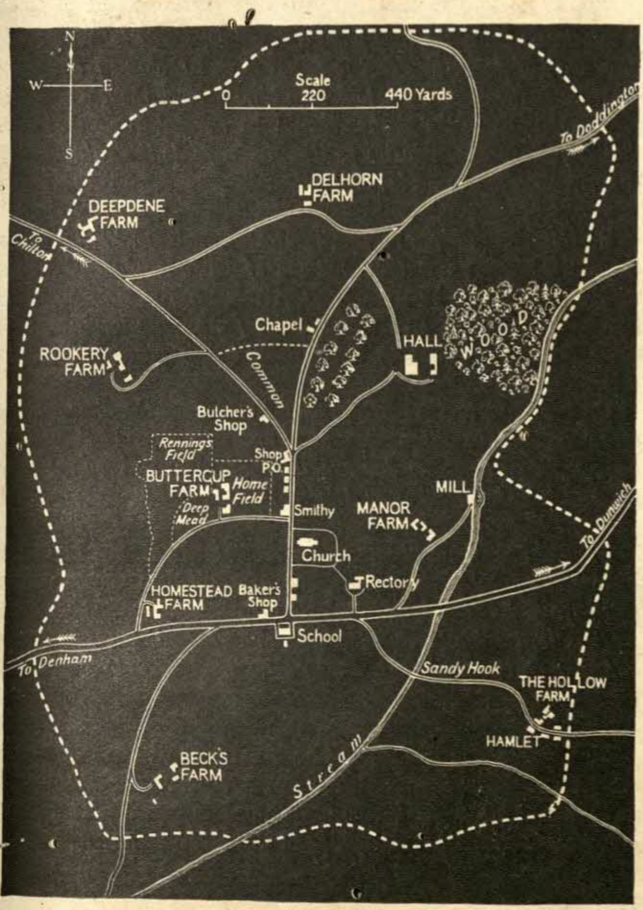
## OUR VILLAGE

### I. The Village as a Home

1. *In this lesson the children are to be tested in many points which have been dealt with in the preceding lessons. They will also gain some idea of the inter-dependence of one man on another, for they will learn that the big world beyond their own little one is dependent upon work which they see going on around them every day.*

**The town could not exist without the products of the country; the country relies upon the resulting town industries.**

*The teacher should therefore impress upon his scholars the points in the lesson where these principles are inferred.*



PLAN OF THE VILLAGE OF OXENDALE.

2. *A good general plan of the whole village, with the cardinal points marked on it, should be put before the class. It ought*

*to be fairly large, and should be drawn as near to scale as possible.*

*This plan must be made familiar to the children; it must be something in which they have a tangible, lively interest. No better way of doing this can be found than by placing the plan either on the floor or on a table, and gathering the class round it. In doing this the teacher should be careful to see that it is placed in its proper relative position as regards the village itself —north pointing to north, and so on.*

3. *Get the children to familiarise themselves with the plan by pointing out on it the positions of various places, marked or not marked* — **the houses, their own homes, the lanes, the farms, the near cuts** *from place to place,* **the shop, the church, the school,** *and any places of interest to them.*

*Question as to the direction of the roads, the flow of the stream if there be one near, and so on. How would they go to the towns near? How far are they off, measured by the time it would take in walking or driving?*

4. *Encourage the children* **to draw similar plans at home,** *not only of the village, but also of* **their home and garden** *and the* **neighbouring fields,** *etc.*

*It is impossible to put down the result of this part of the lesson, as no two villages are alike, but it all leads to the following points:—*

5. Our village lies **near the main road** leading from one town to another. Other **narrower roads lead out** of this one road to farms and hamlets near. They are narrower **because there is less traffic on them.**

*Let the children tell of the traffic that goes along the main road.*

On this main road, near the middle of the village, there is **the church, the school, some shops,** and **a few houses.** It is often called **the village.**

The houses are mostly scattered about the village—a

**farm and some cottages** in one place, a little distance off **another farm and cottages,** and so on. All are surrounded by green fields and corn lands.

6. This village is my home. It is where my parents live and work. Every one knows me, and I know every one in the village.

I know **where the best blackberries** grow; I know **where to find most birds' nests; where the largest fish** are to be caught in the stream; **where the earliest primroses** are found. The whole village is like **one large home to me.**

Why does your father live in this house away from all others? He lives near his work, which is on this farm. When his work is done in the evening he is tired, and **does not want to walk a long way.**

## II. How its Wants are supplied

1. *Let the children now be taken for a walk through the village street, so that they may point out the various places as they are mentioned. Take the shops in the order in which they are found in the village, but leave the church, chapel, and schoolroom until the last.*

Why do you live in this village? Because my father works here.

There are many things which we want—**food, clothes,** and **household things.** Some of the food is **grown in our gardens;** the remainder is **bought from the shops.**

Tell me one article of food that is bought? Bread.

2. The Baker.—Here is the baker's shop. The baker **makes bread,** and sometimes **cake.** He also sells flour.

Where does the flour come from? It comes **from the wheat** which the farmers grow.

**Father helps to make this wheat grow;** the miller grinds it; and, when it is made into bread by the baker, we eat it.

**Most of the flour is, however, taken to the towns** for the food of the people living there.

3. *Take the children into the bakehouse; call attention to the* **trough,** *the* **sacks of flour,** *and the* **oven**; *and describe briefly the work of bread-making.*

1. THE BUTCHER.—*Elicit that another important article of food is meat. Ask what animals the butcher kills, and the* **name for the flesh of each.**

Where do these animals come from? They are reared and fatted on the farms.

*Remind the children that we have seen where this is done.* **Father helps to fatten them.** *Tell again that* **most of the fatted animals are sent into the towns** *for food.*

2. There is a part of the animal which we do not eat? Yes, **the skin.**

What is done with that? It is made into **leather for our boots.**

*Point out that the leather is not made in the village. The skins have to be taken to the town* **to be tanned** *and* **made into leather.** So we in the village **find work for people in the town**; we wear what they have made.

3. How do we get them from the town? **The carrier brings them.**

Can you tell me another part of the animal which finds work for people in the town? Yes, **the wool of sheep.** This is made into the clothes we wear.

The flesh of animals is eaten, and **their covering is made into articles of clothing.**

*Notice next the butcher's open windowless shop.*

Why is this? The butcher must **keep the shop cool,** or the meat would soon go bad and be unfit for food.

1. THE SHOP AND POST-OFFICE.—*Call upon the children to name other things that enter into our daily wants—such as*

**clothing, oil for lamps, tea and sugar,** *etc. etc. Then lead them to the shop-window, and note the various articles displayed.*

What a lot of different things the shopkeeper sells—knives, ropes, spades, boots, nails, sugar, candles, bacon, oil, butter, cottons, — nearly everything we can think about.

2. Have you ever been to a town? Are the town shops like this? No; each shop keeps separate articles. One sells **grocery,** another **iron things,** another **china goods,** another **sweets,** and another **clothes.** Our shopkeeper sells all these in one shop.

Why not have separate shops in the village.

*A few simple questions will lead up to the answer.*

The shopkeeper gets a profit on the things he sells, and on this profit he lives. He does not sell enough of one thing to keep him, **because there are only a few people in the village,** so he must sell many things.

These things are made in towns, some of them from things grown in the country.

3. Can you mention a thing which the shopkeeper does not sell?

*Various answers will be given. Point out that he would not sell one of these things in a year, and so he does not keep them.*

How do we get them when we want them? **They are bought in the town,** and the carrier brings them.

*Notice that this carrier seems to be* **an important and necessary man in the village,** *and tell that one of these days we will have a talk about him.*

4. But there is another part to this shop? What do we call it? The **post-office.**

*Lead the children to tell that* **the postman brings letters** *and parcels from the town in the morning, and carries back those which the people of the village wish to send away.*

How do we pay for these? We buy a penny stamp at the post-office, and stick it on the outside of the letter. **This stamp is to show that we have paid to have the letter carried.** We have nothing else to do but to post the letter in the letter-box at the post-office. This is the way we hear from and write to our friends in other places.

*A few questions might also be asked in order to show how the post helps people—farmers and others—in their business.*

1 THE SMITHY.—*This is always a place of delight to the children. They will be eager to point out* **the forge for heating the iron, the bellows for making the fire fierce,** *and* **the anvil** *on which the red-hot iron is beaten into shape.*

2. Tell me what work the blacksmith does? He makes **shoes for horses,** and puts them on; he **mends machines** and iron articles used in our houses, and he **bonds wheels.** He is a very useful man in the village. We do not know how we could manage without the blacksmith.

*Let the children watch the blacksmith at work. They will like to do so, and they will learn* **how easily iron is bent,** *and even* **joined together,** *when it is red-hot.*

1. THE CARPENTER'S SHOP.—*Take the class into the workshop, and call attention to the numerous tools and their uses. Show the* **saw-pit,** *where the trunks of trees are cut up into wide planks, with a very big saw. Tell that this is done in towns* **in a saw-mill.**

The blacksmith works with iron, **the carpenter works with wood.**

2. He makes many things—**gates, railings, tables, carts,** and **waggons.** He also mends any articles of wood that are broken. He finds plenty of work in the village.

What a lot we have seen and learned. **Our village after all is a very important place.** It finds work for all its own people, and also for many who live in the town. **We look to the town people for many things which they make; they depend upon us for many things we grow.**

### III. Where the People meet

1. The Church and Graveyard.—*Rapidly draw attention to the large building,* **placed east and west,** *and built of stone, with* **a high tower or spire.** *The bells are in the tower. On Sundays, and sometimes through the week, they fill the air with sweet sound.* **They call the villagers together for worship.** *At Christmas time they ring merrily every evening. People love to hear the bells. In the quiet scattered village during the dark winter evenings their merry clang makes the people feel that friends are near. They are comforting and joyous.*

2. Here then the villagers meet at least once a week as members of one family. **They worship God together,** and thank Him for His many gifts.

Here too rest the villagers of past time—some of our relations and friends are buried here. **It is a sacred spot.**

Where does the clergyman live? He lives in that large house near the church. It is called the **Rectory** or **the Vicarage.**

The Chapel.—Do the people meet anywhere else? Yes; many of them meet in **the chapel for worship,** instead of the church.

The School.—We meet every day in school. We are taught there to read and write, and **are made fit to fill our places in the busy world** when we get older. In the winter evenings there are concerts in the schoolroom, and again the people meet together to enjoy themselves.

## Lesson XI.

## THE CARRIER'S CART

### I. Introduction

1. *In the last lesson we had a few words to say about the carrier; and we led the children to infer, from the kind of work which he does, that he must be a very important and necessary man in the village.*

*Since then, and as a preparation for what is now to follow, the teacher should have encouraged the children to watch the carrier set out on one of his journeys some morning.*

2. *Commence the lesson by referring to this, and lead the children to tell what they themselves have observed.*

The **big, roomy, covered van** moves slowly along the village street, and the carrier himself walks beside it. At every few steps he either seems to have a call to make, or is stopped by one or other of the villagers. He seems to be a very busy man, and **he puts down in a book** what they want him to do for them.

3. At last, when he reaches the end of the village, he gets up on the box in front of the van, and **drives off at a trot.**

*Elicit from the children that as they watch him drive away, the three most natural questions for them to ask are:*—"**Where is the carrier going? Why does he go there? Why does he go on certain days only?**"

### II. The Carrier's Journeys

1. *Refer to the lesson on "Our Village," and lead the children to tell why the carrier is needed.* We cannot buy every-

thing we want for our use in the village; some of the things **can only be bought in the big shops** in the towns.

The towns are some distance away, and **everybody has not a horse and cart of his own.** Hence the carrier "**goes on errands**" for everybody who wants him.

Where then does the carrier go? He goes to the towns near.

2. Then he does not always go to the same town? No; he goes to one town on a certain day, to another the next, and so on.

Why is that?

*Tell that in each of these towns* **a big market is held** *one day in every week. That day is known as* **market-day,** *and the town itself is called a* **market-town.** *In some of the larger towns there are* **two market-days in each week.**

3. One town holds its market on Monday, another on Wednesday, another on Saturday, and so on; but **no two towns** near each other **hold their markets on the same day.**

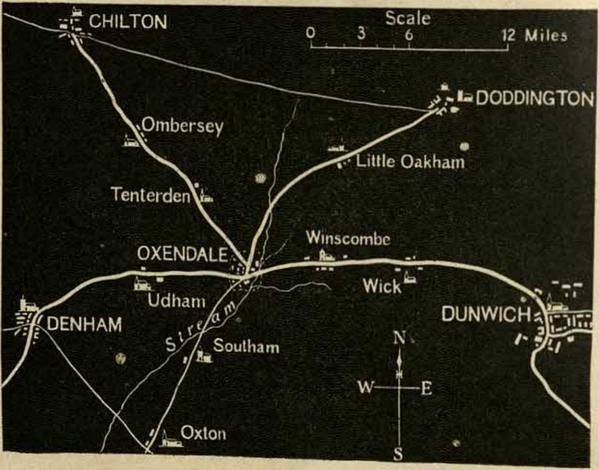
The carrier chooses market-day for his visit to each of these towns, and he makes **the same journey on the same day** throughout the year, winter as well as summer.

4. *It would be well to draw on the black-board a rough sketch-map, showing the relative positions of the village and the neighbouring market-towns, with the roads leading to each. The board should then be placed either on the floor or on a table, so that the class may be grouped round it.*

*In this way it will be an easy matter to trace intelligently to the children the carrier's various journeys, and they will see for themselves that on his way to either of these market-towns,* **he must pass through several other villages** *like their own.*

5. *Tell them that the people of those villages know when to look out for him, for he always gets to the same place about the same time every journey.*

All who have any errands for him to do in the town watch for him, and he takes down their orders as usual in his book.



MAP OF DISTRICT ROUND OXENDALE.

The carrier therefore is **useful in other villages** besides our own. All the villagers on the road to the town learn to depend on the carrier.

1. WHAT THE CARRIER TAKES.—*The next step is to describe the town itself on market-day. No doubt some of the children have been to market. Lead these to tell what they have seen. One boy will say that he saw a lot of* **cattle, sheep, and pigs in pens**; *another that there were a* **great many stalls in the market-place,** *with butter, eggs, poultry, fruit, vegetables, and all sorts of things for sale; another that there were* **a great many other carriers' carts** *standing about,*

*besides the one from our village ; another that* **the town was full of people,** *and that* **every one seemed to be busy.**

2. *Explain the meaning of all this :*—Everybody from all the villages round take or send to the town on market-day whatever they have to sell. The farmer takes his cattle, sheep, pigs, poultry, butter, eggs—indeed all the produce of his farm ; many of the people, especially those with large gardens, send flowers, fruit, and vegetables ; and even the villagers often have something to send to market, such as eggs, poultry, honey, fruit, and things of that sort.

3. *Point out that it is* **these poor people who find the carrier so useful.** *The farmer's men take everything he has to sell into the town for him ; he drives to market in his smart trap. The other people send their flowers, fruit, and vegetables in carts and waggons. But without the carrier's cart those poor people* **would not be able to send to market** *anything they have to sell.*

4. Sometimes **the carrier sells their goods for them ;** sometimes they have stalls in the market, and **sell the things themselves.** His cart carries people as well as goods. It often has a very heavy load to carry, for it not only **takes goods to the market-town** from all the villages on the way, but it also **takes some things from one village to another.**

These people seem to have to go a long way to sell their goods.

Why not hold a market in each village? Because there are so few people in the village ; **there would be no one to buy** in the villages.

WHAT THE CARRIER BRINGS BACK.—*Remind the children that there are many articles of household use which can only be bought in the towns.*

The carrier is a very busy man in town all day long, for he has to visit a great many shops **to buy all sorts of things for the villagers,** whose orders he took down in his book when he set out. He has to be very careful, or he would easily make mistakes. He brings back with him the goods which he buys in the town. But when he is ready to start for home in the evening **there are always some people,** as well as goods, **to carry back,** some to one village, some to another. He therefore has **a heavy load to bring back.**

## III. THE CART OR VAN

1. *Take the children to the carrier's yard, choosing a day when the carrier himself is at home. On the way talk about the journeys in the cold winter, and in the hot summer. He travels in all weathers—hot and cold, wet and dry, frost and snow.*

*He has long distances to go, and heavy loads to carry. In this way lead the children to tell that—*

His cart or van must be **strong,** but it must also be **light.** A farmer's waggon is very strong, but it would not do for this work. Why not?

2. It must be **large** and **roomy,** for he often has to carry **a heavy load of people as well as goods.** It must have **good springs.** Why?

It must be covered **to protect the passengers and goods** from the sun and rain. Butter would quickly melt on a hot day, if it were carried in an open cart.

1. THE BODY OF THE VAN.—*Examine the van now, and show that it fulfils all these requirements. Let two of the boys try to pull it. They can just manage to move it, but they could not move a waggon.* Though as large as a waggon, it is **not nearly so heavy.** As it is light it runs easily. The horses can trot along with it when it is full. The carrier must go as quickly as he can to get over the ground, **but he must not overwork his horses.**

2. *Show next how the horses are harnessed to the van. It is probably a two-horse van; if so, compare the harnessing to the harnessing of a waggon.*

The horses are harnessed **on either side of a long pole,** which is fixed to the middle of the axle of the front wheels. The driver sits on a box in front of the van.

THE COVER.—*Notice that this consists of a* **strong framework of wood,** *over which* **a tarpaulin,** *that is, a tarred or painted cloth, is tightly stretched,* **to keep out the weather.** *The front is open; the back is closed by two flaps of the same thick weather-proof cloth.*

This light strong cover is made **to fit the van exactly**; the ends of the wooden framework drop into iron slots, and are **bolted securely to the sides of the van.**

THE HORSES.—*Show the children the horses in the stable now. Tell that they had a long journey yesterday, and they will have another long journey to-morrow. To-day they are resting comfortably in their stable.*

The carrier is **very careful of his horses,** for his work depends upon them. He gives them a clean comfortable stable, and plenty of good corn to eat. They rest and feed when they get to the town, and they sometimes get a short rest at one of the villages both going and coming.

## IV. THE CARRIER

1. Here is the carrier. Let us ask him a few questions. *The information that follows supplies by inference the kind of questions asked.*

Yes, it is pleasant sometimes, but it is very tiresome work—the same thing and the same roads day after day.

The worst time of course is the winter. Sometimes it is so bitterly cold that I cannot feel the reins between my fingers. The horses often slip and slide on the frozen snow, and I have to get down and lead them. They are rough-shod then, or frost-nails are driven into their shoes; without this they would not get along at all.

2. Then there is the wet weather. Why, sometimes I could wring the water out of my coat. You see I wrap my legs up with a waterproof rug, and wear a waterproof coat, but still the wet gets in, particularly if I am driving against the rain. The cold rain often makes my face tingle and smart.

3. Well, we are not so busy now as carriers used to be. My father, who was carrier before me, often had more parcels than he could bring at one time. But you see the trains now carry many things that used to come by the carrier.

We do not meet with many accidents; we are too careful, and we do not drive fast.

My longest journey is eighteen miles, to Dunwich. That makes thirty-six miles in the day. My horses rest all next day, for we have to be very careful of them.

THE END

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